The Manual of
Practical Potting

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OF

PRACTICAL POTTING

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REVISED AND ENLARGED
FOURTH EDITION

SPECIALLY COMPILED BY EXPERTS

AND EDITED BY

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PREFACE TO THE FIRST EDITION

THE proprietors of the *Pottery Gazette*, in presenting the *Manual of Practical Potting* to the trade, desire to say that no pains have been spared to make the work of unique value to those engaged in the business, their sole aim being to render it so complete in every particular that it might become to be universally regarded as the chief text-book for reference wherever the manufacture of ceramics is followed.

The information contained in the manual cannot fail to be of interest to every manufacturer desirous of perfecting his productions to the highest excellence. The various formulæ now published for the first time are the outcome of years of study and repeated experiment on the part of several members of the trade, whose individual experience has been of an exceptionally practical nature. The classification of the information given into a chain of connection has rendered them easy of instant comprehension by the intelligent operator.

The progressive improvements in the manufacture of china and earthenware which have taken place during the last forty years have indisputably raised the art to a pitch of excellence unequalled in the whole of the world's history—a culmination of circumstances mainly attributable to untiring practical and scientific research and experiment.

PREFACE TO THE SECOND EDITION.

A SECOND edition of the *Manual of Practical Potting* being demanded, the compilers have revised the whole work with the view of bringing the information up to date.

A number of new recipes have been acquired, and are incorporated in the body of the work, while some obvious errors have been corrected.

In the recipes built up by the labours of the bygone masters of the potter's art there seems to the scientific mind much that is obsolete, but there is, at the same time, something to be learned from them. Old methods have been superseded, but the results attained long ago are still pre-eminent in some directions. It is well, therefore, not to cast aside the work of a former generation as unworthy of attention; perchance even the scientist can be taught, and the best man is always he who is willing to learn.

It must not, however, be supposed that any great number of the recipes here given are old: very many of them are in use at the present time in the best English manufactories, while some apply, as is neces-

sary for the completeness of the work, only to the cheaper grades of ware. The clever potter will use these mixtures as suggestions, and, taught by his superior skill, will modify them to suit his own purpose.

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THE RISE AND PROGRESS OF THE POTTER'S ART IN ENGLAND.

THE art of husbandman ranks as the only competitor in antiquity with the potter's craft in the history of the world's industries, data unique and indubitable being abundantly manifest to prove the correctness of this assertion.

The earliest exponents of the potter's art have rendered most remarkable aid in elucidating abstruse theories concerning the literature and manners and customs of nations, the record of which would have been otherwise entirely lost. From this cause alone the practice of the potter's art excites a deep and peculiar interest, irrespective of any other consideration to which its operations may tend.

No branch of manufacture presents so intimate and ancient an alliance between art and utility as that of the potter, whose earliest productions take their rise from a date which in the Eastern Hemisphere is lost in the darkness of remote antiquity. The ceramic art, both in its theory and practice, unites a combination of qualities unknown in any other expression of human skill. No other industry presents so many divers considerations, all of them of the utmost interest, and each one rich in economic and scientific application.

Finding its materials at or near the surface of the earth, pottery displays manufactures the most simple and yet the most varied—the easiest to fabricate, and, though fragile, of

incomparable durability. The products of these substances are absolutely endless in their variety, while in their most successful exponents their beauty may be pronounced as matchless.

Every species of form, from the classical severity of the early Greek period to the florid luxuriance of the wares of Saxony, France, and, one may now fairly add, England, here finds a fitting and worthy medium.

A material which science teaches to present the most lustrous surface, which is solid, imperishable, and admirably qualified for the application of varied and brilliant colouring, offers such inducements to the painter that even the pencil of the glorious Raffaelle himself was occasionally employed in its decoration.

Without doubt the potter's art had its rise in the land of Egypt, from whence it travelled to Greece; and to the refined taste of that country the ceramic industry is indebted for its most beautiful shapes. The Romans did much to diffuse the making of pottery in the countries conquered by them, in this country especially. Ever since the Roman invasion potteries have had an existence in different parts of England, particularly in Staffordshire, as is evidenced by the quantity of pottery fragments that have been upturned in the course of ages.

The term "pottery" is derived from the Latin *poterium*, the name given by the Romans to drinking vessels: but this does not convey any signification denoting either form or substance.

The word "ceramic," the generic title by which works in this department of art manufacture are now known, is derived from the Greek. It primarily signifies the "horn of an animal." It has obtained its generally recognised signification from the early use of horns for drinking purposes, which in their turn gave place to articles made from plastic materials.

For many years the manufacture of pottery was of the most primitive type; but it gradually came to be regarded as the vehicle for artistic taste, and, in the mediaeval age, attracted the attention of famous artists on the Continent, as is evidenced by the lovely works, still extant, associated with the honoured names of Palissy and Luca della Robbia, which for all time will be regarded as masterpieces.

Although the potter's art flourished in China prior to the Christian era, in this country very little was known of it until the reign of Elizabeth, who endeavoured to found potteries, with but indifferent success; indeed, little of importance was acomplished until the close of the sixteenth century. The first articles of which we find mention made were butter-pots and "tygs," the latter a peculiar species of handled drinking vessel. Ornamental dishes appear to have been made at Burslem, "the mother of the potteries," as early as 1650, the glazing of which was effected by means of lead. Thirty years later the purest accident led to the substitution of salt for lead in this particular, the first use of which was made by a potter named Palmer. The ware when salt glazed was known as "cranch ware," and the manufacture proved a source of considerable employment.

The first attempts that were made to imitate the work of the Eastern potters was a decided failure; but in 1690 two brothers, named Elers, discovered a bed of fine compact clay at Bradwell Wood, near Burslem, which enabled them to produce with exact success a fictitious Japanese ware.

The use of calcined and ground flint as an ingredient of pottery is attributed to the younger Astbury in 1720, and led to great and highly important improvements in the wares in Staffordshire. The new material was used in combination with pipe-clay and sand, coloured with oxide of copper and manganese.

A year later another innovation was introduced by Ralph

Daniel, of Cobridge, from France, in the shape of moulds of plaster of Paris, which speedily became adopted by the English potters.

The forms and patterns of the wares produced at this period were generally obtained from the silver plate of the time: the colours of the bodies were known as drab or cream-coloured and white. Painted ware of a crude type also came into general use a few years later; but it was not until the middle of the century that printed ware was introduced.

Such was the condition of English pottery manufacture in the district specially identified with the art when another Pallissy arose in England in the person of the great Wedgwood, who was born in the year 1730. At an early age he worked as a thrower at the potter's wheel in his elder brother's manufactory: but the state of his health compelled him to relinquish this occupation, and he afterwards followed the natural inclination of a mind richly endowed both with ingenuity and enterprise. In the year 1759 he succeeded in making a rich cream-coloured ware, by which he quickly attained a high degree of celebrity, so much so that he at once became the royal potter. At the same time Wedgwood sold his ware at a price which brought it within the means of general consumption both at home and abroad. How Josiah Wedgwood enhanced the reputation of the Staffordshire Potteries is a matter of common knowledge. Suffice it to say, that since his day the art in the district has shown no retrograde movement; on the contrary, it has gone on increasing year by year in excellence, till at the present time it towers above any of its foreign competitors.

Contemporaneously with Wedgwood, the china works at Bow and Chelsea came into prominence, followed by those of Plymouth, Derby, and Bristol. It was at Plymouth that the first true porcelain of hard paste was made by the

learned Dr. Cookworthy, although it had previously been produced by Böttcher at Meissen in Saxony, whose success was so great that he induced the Elector of that country to establish a royal manufactory of porcelain near Dresden, which is in existence at the present day, as is also another manufactory first established through royal influence at Sèvres in France.

The Royal Porcelain Works at Worcester were established by Dr. Wall in 1751. Five years later the important process of transfer printing was discovered and adopted at Worcester, from which place it travelled to Coalport in Shropshire, and thence to the Potteries of Staffordshire.

Besides the names before mentioned as important factors in the dissemination of the ceramic art in this country, Messrs. Minton, Spode and Copeland, Ridgway, Davenport, and many others, have done yeoman service in furthering the industry, which has now grown to enormous proportions.

In the year 1700 the whole of the Pottery district only contained fifty ovens, the small holding capacity of which permitted only a very restricted output. Again, in the year of the Great Exhibition, 1851, which did so much to encourage the potter's art, the number of fictile establishments in Staffordshire only numbered one hundred and thirty-three: while at the present time this has increased to the phenomenal number of three hundred and forty in the Potteries alone, while there is a large number of pottery manufactories scattered over different parts of England, Scotland, and Wales. The sum total of the exports of china and earthenware from this country alone amounted to considerably over two millions in 1892, to say nothing of the enormous increase of home consumption. From this it will be apparent to what considerable proportions the industry has grown during the last forty years.

The introduction of mechanical aid in place of manual labour will, to a great extent account for the increment of production, together with more methodical means for effective manufacture necessitated by the enlarged demand.

The institution of Government Schools of Art throughout the country, and the holding of Exhibitions, have done much both to encourage the necessary artists and designers, and to bring the taste of the public up to the high standard it now occupies; and it is obvious that the ceramic art as it has itself progressed in excellence has had a benign influence not only on the English race, but all over the world.

The potter's art has still a great future before it, not only in producing things of increased beauty and utility, but in finding employment for the teeming masses of the population of the districts specially identified with its manufacture.

CHAPTER I.

BODIES.

CHINA AND PORCELAIN BODIES.

In selecting a china body regard must be had both to the class of work intended to be produced and to the decree of fire available. Generally speaking, the more bone there is in a mixture the greater will be the heat necessary; but, on the other hand, a body that will stand a severe fire is of better appearance and finer quality than a less refractory one. Some of the following recipes are in use by leading manufacturers, and amongst them will be found bodies of almost every conceivable variety:—

1 **LONGPORT CHINA BODY.**

225	lbs.	Calcined Bone	Glaze No. 1.
150	"	China Clay	
82	"	China Stone	
15	"	Flint	
472			

2 **ALCOCK'S CHINA BODY.**

70	lbs.	Calcined Bone	Glaze No. 3.
50	"	China Stone	
40	"	China Clay	
160			

3 ALCOCK'S CHINA FIGURE BODY.

86 lbs.	Calcined Bone . . .	Glaze No. 3.
62 ,,	China Stone . . .	
50 ,,	China Clay . . .	
198		

4 CHINA CASTING BODY.

42 lbs.	Calcined Bone . . .	Glaze No. 3.
24 ,,	China Stone . . .	
18 ,,	China Clay . . .	
6 ,,	Flint	
90		

5 CHINA BODY.

200 lbs.	Ground Bone . . .	Glaze No. 4.
130 ,,	China Stone . . .	
150 ,,	China Clay . . .	
10 ,,	Flint	
490		

6 CHINA BODY.

440 lbs.	Calcined Bone . . .	Glaze No. 4.
260 ,,	China Stone . . .	
260 ,,	China Clay . . .	
25 ,,	Flint	
985		

7 CHINA BODY.

350 lbs.	Calcined Bone . . .	Glaze No. 5.
275 ,,	China Stone . . .	
250 ,,	China Clay . .	
875		

8 DESSERT CHINA BODY.

140 lbs.	Calcined Bone	Glaze No. 5.
100 „	China Clay	
80 „	Swedish Felspar	
10 „	Flint	
330		

9 DESSERT CHINA BODY.

140 lbs.	Calcined Bone	Glaze No. 5.
90 „	China Stone	
80 „	China Clay	
7 „	Blue Clay, finely sifted	
317		

10 CHINA BODY (1810)

40 lbs.	Calcined Bone	Glaze No. 6.
36 „	China Clay	
25 „	China Stone	
2 „	Flint	
103		

11 CHINA BODY.

400 lbs.	Calcined Bone	Glaze No. 9.
200 „	China Stone	
300 „	China Clay	
900		

12 CHINA BODY.

300 lbs.	Calcined Bone	Glaze No. 9.
150 „	China Clay	
90 „	China Stone	
20 „	Flint	
560		

13 **CHINA BODY.**

230 lbs. Calcined Bone . . .		
120 „ China Clay . . .	Glaze No. 10.	
100 „ China Stone . . .		
450		

14 **CHINA BODY.**

450 lbs. Calcined Bone . . .	
230 „ China Stone . . .	Glaze No. 13.
220 „ China Clay . . .	
30 „ Flint	
930	

15 **CHINA BODY.**

370 lbs. Calcined Bone . . .	
250 „ China Clay . . .	Glaze No. 14.
130 „ China Stone . . .	
35 „ Flint	
785	

16 **SPODE'S BODY.**

120 lbs. Bone, 80 „ Flint } ground together . .	
Add	Glaze No. 15.
80 „ China Stone . . .	
40 „ China Clay . . .	
320	

17 **CHINA BODY.**

856 lbs. Bone . . . .
700 „ Stone . . . .
360 „ China Clay . . .
1916

18 FENTON CHINA BODY.

290 lbs. Bone	
171 „ Stone	
150 „ China Clay	
20 „ Flint	
631	

19 CHINA BODY.

696 lbs. Bone	
528 „ Stone	
396 „ China Clay	
60 „ Flint	
1680	

20 NANTGARW CHINA BODY (Soft Paste).

175 lbs. Lynn Sand	Fritted.
25 „ Pearl Ash	

325 lbs. Bone	
200 „ Fritt	
100 „ China Clay	
625	

21 FRITT CHINA BODY.

25 lbs. Lynn Sand	Fritted.
2 „ Pearl Ash	

12½ lbs. Fritt	
60 „ Bone	
50 „ Stone	
50 „ China Clay	
7½ „ Ball Clay	
180	

22 CHINA BODY.

50	lbs.	Bone
40	,,	Stone
24	,,	China Clay
114		

23 CHINA BODY.

50	lbs.	Bone
35	,,	Stone
20	,,	China Clay
105		

24 CHINA BODY.

34	lbs.	Bone
36	,,	Stone
32	,,	China Clay
102		

25 CHINA BODY.

365	lbs.	Bone
343	,,	Stone
216	,,	China Clay
924		

26 LAKIN'S CHINA BODY.

360	lbs.	Bone
230	,,	China Clay
50	,,	China Stone
20	,,	Flint
20	,,	Blue Clay
680		

27 CHINA BODY.

80 lbs. Bone . . . .
35 „ China Clay .
15 „ Blue Clay — Glaze No. 8.
80 „ Stone .
15 „ Flint . . . .

225

28 CHINA BODY.

50 lbs. Bone . . . .
40 „ Stone . . . .
34 „ China Clay . . .
2 „ Flint . . . .

126

29 CHINA BODY.

588 lbs. Bone . . . .
354 „ Stone . . . . — Glaze No. 17.
312 „ China Clay . . .

1254

30 CHINA BODY.

856 lbs. Bone . . . .
254 „ Stone . . . .
432 „ China Clay . . .
170 „ Blue Clay . . .

1712

31 MASON'S CHINA BODY.

28 lbs. Bone . . . .
20 „ China Clay . . .
16 „ Stone . . . .
3 „ Flint . . . .

67

32 CHINA BODY.

35 lbs. Bone . . . . .
17 „ China Clay . . . .
20 „ Stone . . . . .
3 „ Blue Clay . . . .

75

33 PORCELAINE FRANÇAIS LIMOGES.

50 parts China Clay . . .
40 „ Felspar . . . .
10 „ Flint . . . .
6 „ Steatite . . . .

106

34 CHINA BODY.

50 lbs. Bone . . . . .
35 „ China Clay . . . .
8 „ Stone . . . . .
3 „ Flint . . . . .
4 „ Blue Clay . . . .

100

CHINA BODIES.

	35	36	37	38	39	40	41	42
Bone . . .	200	144	24	80	40	240	640	50
Stone . . .	180	60	16	80	33	260	426	30
China Clay . .	75	84	16	35	30	260	387	30
Blue Clay . .	80	...	8	15	...	...	...	...
Flint . . .	30	24	...	15	..	...	...	...
	565	312	64	225	103	760	1453	110

	43	44	45	46	47	48	49	50
Bone . . .	40	40	20	42	40	46	37	34
Stone . . .	23	40	24	27	24	28	25	23
China Clay . .	35	20	48	30	20	20	31	32
Blue Clay . .	...	...	8	...	10	6	5	5
Flint . . .	2	...	...	1	6	...	2	6
	100	100	100	100	100	100	100	100

PARIAN BODIES.

Parian is theoretically an imitation of marble, and is composed in the main of felspar and stone, to which are added other materials in order to simplify the manufacture and firing.

China Clay is used on account of its refractory nature, and a little flint is sometimes employed, though an excess of this will give an unpleasant heavy effect to the body. In the employment of glass care must be taken to secure uniformity of composition. English flint glass will be found to give the best results.

1 PARIAN FRITT.

80	lbs.	Lynn Sand	Calcine at Biscuit heat.
35	,,	Felspar	
15	,,	Stone	
12	,,	Pearl Ash . . .	
142			

2 PARIAN BODY.

50	lbs.	Fritt, No. 1 . . .
130	,,	Felspar . . .
130	,,	China Clay . . .
20	,,	Flint Glass . . .
330		

3 PARIAN BODY FOR STATUETTES.

50	lbs.	Fritt, No. 1 . . .
85	,,	Felspar . . .
75	,,	China Clay . . .
210		

4 PARIAN BODY FOR SMALL ARTICLES.

200	lbs.	China Clay . . . .
350	„	Felspar . . . .
25	„	Flint . . . .
575		

5 PARIAN BODY.

300	lbs.	Felspar . . . .
180	„	China Clay . . .
480		

6 PARIAN BODY.

200	lbs.	Felspar . . . .
100	„	China Stone . . .
150	„	China Clay . . .
450		

7 PARIAN FOR LACES AND DRAPERY.

60	lbs.	Felspar . . . .
40	„	China Stone . . .
55	„	China Clay . . .
155		

8 PARIAN BODY.

8	lbs.	China Clay . . .
6	„	Stone . . . .
8	„	Felspar . . . .
3	„	Flint Glass . . .
25		

9 PARIAN BODY.

12	lbs.	China Clay
5	„	Stone
6	„	Felspar
3	„	Flint Glass
26		

10 PARIAN BODY.

30	lbs.	China Clay
30	„	Stone
38	„	Felspar
98		

11 PARIAN BODY.

40	lbs.	China Clay
40	„	Stone
80	„	Felspar
160		

12 PARIAN BODY.

24	lbs.	Felspar
8	„	China Clay
32		

PARIAN BODIES.

	13	14	15
China Clay	8	6	8
Stone	16	6	8
Felspar	4	8	2
Flint Glass	4	2	2
	32	22	20

SEMI-PORCELAIN AND VITREOUS BODIES.

Ironstone, stoneware and vitreous are interchangeable terms, and are applied to those bodies of which the fracture is presumed to be granular rather than chalky. Many of these are termed semi-porcelain because they are partially translucent when well fired, and in fact it is to the fire that they all owe their strength and quality. The large proportion of Cornish stone used gives to the ware its vitreous nature, while the flint prevents it becoming too flexible in the oven. These bodies are subject to loss from over-fire, which, owing to the large proportion of fluxing materials present, will cause blisters to rise on the surface.

1 LONGPORT SEMI-CHINA BODY.

Fritt	12 lbs. Flint . . .		Calcine in Biscuit Oven.
	2 „ Carbonate of Potash		
	12 „ Red Lead . .		
	1 lb. Cobalt Blue . .		
	27		
Mixture	7 lbs. Fritt . . .		Glaze No. 2.
	100 „ Flint . . .		
	500 „ China Clay . .		
	400 „ Stone . . .		
	1007		

2 LONGPORT IRONSTONE BODY.

11 ins. Ball Clay	Glaze No. 1.
7½ „ China Clay	
7½ „ Stone	
1 in. Flint	
27	

3 STONE BODY.

480	lbs.	Stone	
250	„	Blue Clay	
240	„	China Clay	
10	„	Glass	
980			

4 WHITE STONE BODY.

400 lbs. Stone
200 „ Flint
200 „ China Clay
16 pails Ball Clay, 24 ozs.
Stain as required.

5 IRONSTONE BODY.

170	lbs.	Blue Clay	Glaze No. 2.
230	„	China Clay	
300	„	China Stone	
90	„	Flint	
790			

6 IRONSTONE BODY.

$7\frac{3}{4}$	ins.	Ball Clay	Glaze No. 2.
$3\frac{1}{4}$	„	Flint	
$4\frac{1}{2}$	„	China Clay	
$3\frac{1}{4}$	„	Stone	
$18\frac{3}{4}$			

7 MORTAR BODY.

$16\frac{1}{2}$	ins.	Ball Clay
$7\frac{3}{4}$	„	China Clay
$11\frac{3}{4}$	„	Stone
36		

8 MORTAR BODY.

264	lbs.	China Stone
264	,,	Blue Clay
40	,,	China Clay
40	,,	Flint
608		

9 LONGPORT MORTAR BODY.

120	lbs.	Ball Clay
120	,,	China Clay
20	,,	Flint
240	,,	Stone
8	,,	Flint Glass
508		

10 MORTAR BODY.

19	ins.	Ball Clay
11	,,	China Clay
$8\frac{1}{2}$	,,	Flint
$9\frac{1}{2}$	,,	Stone
48		

11 STONE BODY.

15	lbs.	Ball Clay
16	,,	China Clay
8	,,	Flint
12	,,	Stone
51		

12 STONE BODY.

14	lbs.	Ball Clay
10	,,	China Clay
6	,,	Flint
18	,,	Stone
48		

13 VITREOUS BODY.

8	lbs.	Ball Clay
18	,,	China Clay
9	,,	Flint
18	,,	Stone
53		

14 VITREOUS BODY.

14	lbs.	Ball Clay
6	,,	China Clay
4	,,	Flint
22	,,	Stone
46		

15 STONE BODY.

21	lbs.	Ball Clay
14	,,	China Clay
3	,,	Flint
15	,,	Stone
53		

16 INSULATOR BODY.

480	lbs.	Cornish Stone	Glaze No. 1.
250	,,	Blue Ball Clay	
240	,,	China Clay, Common	
10	,,	Flint Glass	
980			

17 PEARL GRANITE BODY.

168	lbs.	Cornish Stone	Glaze No. 1.
223	,,	Cornish Clay	
300	,,	Flint	
100	,,	Blue Clay	
791			

18 IRONSTONE BODY.

$19\frac{3}{4}$	ins.	Ball Clay
$11\frac{1}{4}$	"	China Clay
$8\frac{1}{2}$	"	Flint
$8\frac{1}{2}$	"	Stone
48		Stain as required.

19 STONE AND MORTAR BODY.

16	ins.	Ball Clay
2	"	China Clay
14	"	Stone
32		Stain as required.

20 MASON'S STONE BODY.

$12\frac{1}{2}$	lbs.	China Clay
$2\frac{1}{2}$	"	Blue Clay
$12\frac{1}{2}$	"	Flint
10	"	Stone
$37\frac{1}{2}$		Stain as required.

21 IRONSTONE BODY.

80	lbs.	Ball Clay
70	"	China Clay
60	"	Flint
40	"	Stone
250		

22 IRONSTONE BODY.

$2\frac{1}{2}$	lbs.	Ball Clay
$12\frac{1}{2}$	"	China Clay
$12\frac{1}{2}$	"	Flint
10	"	Stone
$37\frac{1}{2}$		Stain as required.

23 MORTAR BODY.

12	lbs.	Ball Clay
2	,,	China Clay
2	,,	Flint
6	,,	Stone
22		

24 IRONSTONE BODY.

16	lbs.	Ball Clay
30	,,	China Clay
6	,,	Flint
35	,,	Stone
87		

MORTAR BODIES.

Dry Weight.

	25	26	27	28	29
Blue Clay	60	24	60	30	25
China Clay	10	10	20	10	24
Stone	30	10	20	10	48
Flint	10	5	15	...	...
	110	49	115	50	97

EARTHENWARE, GRANITE, AND C. C. BODIES.

Under this heading are placed a variety of bodies of a less vitreous nature than the preceding. They are for the most part porous to some extent, and do not need so hard a fire as those of the ironstone class. Some are suitable for printing, while others are constructed mainly with a view to simplicity of working. In some cases the chief difference between granite and C. C. is that the former is stained, while the latter is not. The slips are, of course, all of the standard weight unless otherwise stated.

1 BEST PRINTED BODY.

21 ins.	Ball Clay	
14 ,,	China Clay	
8 ,,	Flint	
5 ,,	Stone	
——	Stain as required.	
48		

2 PRINTED BODY.

16 ins.	Ball Clay	
9 ,,	China Clay	
6½ ,,	Flint	
1½ ,,	Stone	
——		
33		

3 BEST BODY.

14 ins.	Ball Clay	Glaze No. 4.
10½ ,,	China Clay	
8 ,,	Flint	
4½ ,,	Stone	
——	Stain as required.	
37		

4
WHITE GRANITE BODY.

$12\frac{1}{2}$ ins. Ball Clay . .		Glaze No. 4.
$12\frac{1}{2}$ „ China Clay .		
$6\frac{3}{4}$ „ Flint		
$4\frac{1}{4}$ „ Stone . . .		
36		

5
PALETTE BODY.

$14\frac{1}{2}$ ins. Ball Clay . . .		Glaze No. 30.
$11\frac{3}{4}$ „ China Clay . .		
$8\frac{1}{2}$ „ Flint		
$2\frac{1}{2}$ „ Stone		
$37\frac{1}{4}$		

6
BLUE PRINTED BODY.

$13\frac{1}{2}$ ins. Ball Clay . . .		Glaze No. 4.
$13\frac{1}{2}$ „ China Clay . . .		
6 „ Flint		
3 „ Stone		
36		

7
DOOR FURNITURE BODY.

10 ins. Ball Clay . . .		Glaze No. 27.
13 „ China Clay . .		
$8\frac{1}{2}$ „ Flint		
$4\frac{1}{2}$ „ Stone		
36		

8
COMMON BODY.

27 ins. Ball Clay . . .		Glaze No. 30.
14 „ China Clay		
$8\frac{1}{2}$ „ Flint .		
$4\frac{1}{2}$ „ Stone . .		
54		

9 COMMON PRINTED BODY.

14 ins.	Ball Clay	Glaze No. 30.
$8\frac{1}{2}$ „	China Clay . . .	
$6\frac{1}{4}$ „	Flint	
2 „	Stone	
$30\frac{3}{4}$		

10 EARTHENWARE BODY.

12 ins.	Ball Clay . . . .
6 „	China Clay . . .
5 „	Flint . . . .
$1\frac{1}{2}$ „	Stone . . . .
$24\frac{1}{2}$	

11 PEARL WHITE BODY.

10 ins.	Ball Clay . . . .
5 „	China Clay . . .
5 „	Flint . . . .
$2\frac{1}{2}$ „	Stone . . . .
$22\frac{1}{2}$	

12 CHALK BODY.

60 lbs.	Black Clay . . .	Glaze No. 29.
60 „	China Clay . . .	
90 „	Flint	
210		

13 ALCOCK'S EARTHENWARE BODY.

18 ins.	Ball Clay . . . .
$11\frac{1}{2}$ „	China Clay . . .
9 „	Flint . . . .
$3\frac{1}{2}$ „	Stone . . . .
42	

Stain as required.

14 PRINTED BODY.

$22\frac{1}{2}$	ins.	Ball Clay . . . .
5	„	China Clay . . .
5	„	Flint . . . .
1	in.	Stone . . . .
$33\frac{1}{2}$		

15 BEST PRINTED BODY.

$14\frac{1}{2}$	ins.	Ball Clay . . .
9	„	China Clay . . .
7	„	Flint . . . .
2	„	Stone . . . .
$32\frac{1}{2}$		

16 PRINTED BODY.

28	ins.	Ball Clay . . . . .
19	„	China Clay . . .
10	„	Flint . . . .
$6\frac{3}{4}$	„	Stone . . . .
$63\frac{3}{4}$		

17 GRANITE BODY.

$11\frac{1}{4}$	ins.	Ball Clay . . .
9	„	China Clay . . .
$7\frac{5}{8}$	„	Flint . . . .
$2\frac{1}{4}$	„	Stone . . . .
$30\frac{1}{8}$		

18 C. C. BODY.

$24\frac{1}{2}$	ins.	Ball Clay . . .
$13\frac{1}{2}$	„	China Clay . . .
7	„	Flint . . . .
3	„	Stone . . . .
48		

19 IVORY BODY.

32	ins.	Ball Clay
20	„	China Clay
8	„	Flint
4	„	Stone
64		

20 C. C. BODY.

28	ins.	Ball Clay
6	„	China Clay
6	„	Flint
1¼	„	Stone
41¼		

21 LONGPORT C. C. BODY.

20	ins.	Ball Clay
7	„	China Clay
6	„	Flint
1	in.	Stone
34		

22 COMMON PRINTED BODY.

14	ins.	Ball Clay
10	„	China Clay
6	„	Flint
3	„	Stone
33		

Stain as required.

23 PRINTED BODY.

30	ins.	Ball Clay
25	„	China Clay
16	„	Flint
6	„	Stone
77		

24 PIN BODY (GOOD).

20	lbs.	Blue Clay
10	,,	Flint
60	,,	Stone
20	,,	Plaster
110		

25 GRANITE BODY.

16	lbs.	Blue Clay
30	,,	China Clay
35	,,	China Stone
6	,,	Flint
		Stain as required.
87		

MISCELLANEOUS BODIES.

1 POROUS CELL BODY.

20	lbs.	Ball Clay
14	,,	Flint
20	,,	China Clay
54		

2 MOULD BODY.

$12\frac{1}{2}$	ins.	Flint
$6\frac{1}{4}$	,,	China Clay
$3\frac{3}{4}$	,,	Ball Clay
$22\frac{1}{2}$		

3
SANITARY BODY.

$23\frac{1}{4}$	ins.	Ball Clay
3	„	Flint
13	„	China Clay
$14\frac{1}{2}$	„	Stone
$53\frac{3}{4}$		

4
WHITE TILE BODY.

$14\frac{1}{2}$	ins.	Ball Clay
$8\frac{1}{2}$	„	Flint
$11\frac{3}{4}$	„	China Clay
$2\frac{1}{2}$	„	Stone
$37\frac{1}{4}$		

SAGGER AND CRUCIBLE CLAYS.

1
SAGGER CLAY.

2	cwts.	Weathered Grey Marl
12	lbs.	Cryolite

2
CRUCIBLE CLAY.

8	ins.	Stourbridge Clay, 26 ozs.
5	„	Ball Clay, 24 ozs.
1	in.	Cryolite, 32 ozs.
14		

3 CRUCIBLE CLAY.

12	ins. Stourbridge Clay, 26 ozs.	
8	„ Ball Clay	
1	in. Flint	
21		

4 CRUCIBLE CLAY.

8	lbs. Ball Clay	
5	„ Ground Coke	
4	„ Graphite Ore	
17		

5 CRUCIBLE CLAY.

1	lb. Ball Clay	
1	„ Graphite Ore	
2		

6 RING CLAY.

6	lbs. Ball Clay	
4	„ Flint	
10		

COLOURED BODIES.

Recipes for coloured bodies are always more or less uncertain to follow on account of the great variations in the natural clays so often employed. It is in following such recipes as are here given that the art of the body-mixer is seen. He must thoroughly know his materials, and be prepared to deviate intelligently from the lines laid down.

1 CITRON BODY.

14	ins. Marl, 26 ozs.	. . .
7	,, Ball Clay	. . .
$7\frac{1}{2}$	,, China Clay	. . .
$2\frac{1}{2}$	,, Flint	. . . .
1	in. Stone	. . . .
32		Add Body stain to the required tint.

2 LILAC PORCELAIN BODY.

200	lbs. Bone	. . . .
25	,, Ball Clay .	. . .
115	,, China Clay	. . .
20	,, Flint	. . . .
10	,, Stone	. . . .
15	,, Cauk Stone	. . .
$1\frac{1}{4}$	,, Cobalt Blue	. . .
$386\frac{1}{4}$		

3 CANARY.

25	ins. Shelton Marl Slip, 24 ozs.	.
$5\frac{3}{4}$	,, China Clay	. . .
1	in. Stone	. . . .
$31\frac{3}{4}$		

4 ## YELLOW BODY.

4	lbs.	Marl
2	,,	China Clay
1	lb.	Flint
$1\frac{1}{4}$	lbs.	Stone
$8\frac{1}{4}$		

5 ## BROWN.

50	lbs.	Red Clay
$7\frac{1}{2}$	,,	Common China Clay
1	lb.	Manganese
1	,,	Flint
$59\frac{1}{2}$		

6 ## BROWN OR COTTAGE BODY.

20	lbs.	Red Clay
8	,,	China Clay
4	,,	Blue Clay
2	,,	Flint
34		

7 ## CANE BODY.

5	ins.	Marl, 26 ozs.
2	,,	Ball Clay
$1\frac{1}{2}$	,,	Flint
$8\frac{1}{2}$		

8 ## CANE BODY.

200	lbs.	Best Marl
100	,,	Cornish Stone
300		

9 DRAB BODY.

118 gallons C. C. Slip at 24 ozs.	
7 pints Nickel Oxide Slip, 24 ozs.	
24 ozs. Cobalt Stain	

10 PERSIAN CHINA BODY.

72 quarts China Slip, 27 ozs.	
21 ozs. Nickel	

11 LIGHT DRAB BODY.

50 lbs. Dried Shavings	
1 lb. Manganese	
51	

12 LIGHT DRAB BODY.

200 lbs. Black Marl	
200 ,, Blue Ball Clay	
200 ,, China Clay	
50 ,, Flint	
650	

13 DRAB BODY.

210 lbs. Blue Clay	
80 ,, Flint	
8 ,, Oxide of Nickel	
298	

14 EGYPTIAN BLACK.

50 lbs. Blue Clay	
40 ,, Ochre	
20 ,, Ironstone	
15 ,, Manganese	
125	

15 EGYPTIAN BLACK.

240	lbs.	Blue Clay
120	,,	Ochre
42	,,	Iron-scales
45	,,	Manganese
447		

16 DRY BLACK BODY.

120	lbs.	Ochre
120	,,	Blue Clay
16	,,	Manganese
256		

17 EGYPTIAN BLACK BODY.

65	lbs.	Ball Clay
60	,,	Ironstone
10	,,	Manganese
135		

18 EGYPTIAN BLACK.

235	lbs.	Blue Ball Clay
25	,,	Calcined Nickel
45	,,	Manganese
15	,,	China Stone
320		

19 EGYPTIAN BLACK.

50	qts.	Ball Slip at 24 ozs. to pint
72	lbs.	Ironstone
22	,,	Manganese

20

GREEN BODY.

64 qts. Ball Slip . . . .
1 lb. Verdigris . . . .

21

GREEN BODY.

60 lbs. Ball Clay . . . .
20 ,, Stone . . . .
20 ,, Flint . . . .
12 ozs. Calcined Copper . .

22

LIGHT GREEN BODY.

32 qts. Ball Slip . . . .
11 lbs. Cornish Stone . . .
12 ,, China Clay . . .
9 ,, Flint . . . .
8 ,, Green Chrome . . .

23

GREEN BODY.

40 qts. Ball Slip . . . .
$1\frac{1}{4}$ lbs. Ground Blue Vitriol . .

JASPER BODIES.

Dry Weight.

	24	25	26	27
Blue Clay	17	18	15	28
China Clay	17	14	20	16
Stone	33	20	20	34
Cauk Stone (Sulphate of Barytes)	27	28	36	20
Flint Glass	4	6	6	6
Blue Calx	2	6	3	3
	100	92	100	107

28 GREEN JASPER BODY.

29	lbs. Stone
29	„ China Clay
29	„ Paris White
16	„ Blue Clay
$\frac{1}{4}$	lb. Oxide Chrome
$\frac{1}{2}$	„ „ Cobalt
$103\frac{3}{4}$	

29 WHITE JASPER FOR COLOURED DIPS.

25	lbs. Stone
25	„ Whiting
25	„ China Clay
25	„ Ball Clay
100	

30 LILAC BODY (ALCOCK'S).

265	lbs. Blue Clay
340	„ China Clay
265	„ Flint
90	„ Stone
5	„ Cobalt Blue
965	

31 LILAC BODY.

1	gal. China Slip, 27 ozs.
$1\frac{1}{2}$	ozs. Body Stain

32 YELLOW STONE BODY.

170	lbs. Yellow Marl
80	„ Felspar
250	

33
OLD MAJOLICA BODY.

20	ins.	Red Clay, 26 ozs. to pint .
8	,,	Blue Clay . . . .
4	,,	China Clay . . .
2	,,	Flint . . . .
34		

34
OLD MAJOLICA BODY.

30	ins.	Red Clay, 26 ozs. to pint .
4	,,	China Clay . . .
3	,,	Flint . . . .
37		

35
OLD MAJOLICA BODY.

40	ins.	Red Clay, 26 ozs. to pint
10	,,	Blue Clay . . . .
4	,,	China Clay . . .
2	,,	Flint . . . .
56		

36
OLD MAJOLICA BODY.

50	ins.	Red Clay, 26 ozs. to pint .
$7\frac{1}{2}$	,,	Ball Clay . . .
1	in.	Flint . . . .
$58\frac{1}{2}$		

37
OLD MAJOLICA BODY.

260	lbs.	Red Clay . . . .
72	,,	Common Clay . . .
10	,,	Flint . . . .
342		

38 ## ORANGE.

4 lbs. Good Marl . . .
2 ,, China Clay . . .
1 lb. Flint . . . .
1 ,, China Stone . . .

—
8

39 ## PALE DRAB BODY.

9½ ins. Ball Clay . . .
16½ ,, Marl, 26 ozs. . . .
140 lbs. Felspar . . . .

40 ## DRAB BODY.

54 galls. C. C. Body Slip, 26 ozs. .
3½ pts. Nickel, 27 ozs. . .
10 ozs. Blue Calx . . .

41 ## TURQUOISE BODY.

40 galls. Ball Slip . . .
3 lbs. Turquoise Stain, No. 42 .

42 ## TURQUOISE STAIN.

16 lbs. Barytes . . . .
20 ,, Oxide Zinc . . .
4 ,, Ground Blue Calx . .
— Fritted at the top of Glost Oven.
40

43 ## TURQUOISE BODY.

50 galls. Ball Slip, 24 ozs. . .
3 lbs. Turquoise Stain, No. 42

44 LIGHT TURQUOISE BODY.

62 galls. Ball Slip, 24 ozs. . .
3¼ lbs. Turquoise Stain, No. 42 .

45 TURQUOISE BODY.

15 ins. Ball Clay . . .
6 „ China Clay . . .
5½ „ Flint . . . .
5½ „ Stone . . . .
15 pts. Body Stain, No. 4 . .

46 SAGE BODY.

10 ins. Marl, 26 ozs. . . .
15 „ Ball Clay . . .
2½ „ Flint . . . .
4½ „ Stone . . . .
8 pts. Body Stain, No. 4 . .

47 SAGE BODY.

90 qts. Ball Slip . . . .
64 pts. Sage Body, No. 46 . .
8 „ Turquoise Stain, No. 42 .

48 SALMON BODY.

60 qts. Best Marl, 26 ozs. to a pint .
12 „ Red Slip, 24 „ „ .
13 „ Flint, 32 „ „ .

85

49 TERRA COTTA (SOUTH KENSINGTON).

50 lbs. Best Red Clay . . .
1 lb. Flint . . . .

51

50 RED BODY.

50 lbs. Red Clay	
2 ,, Stone	
52	

51 RED BODY (POROUS).

40 lbs. Bradwell Clay . . .	
4 ,, China Clay . . .	
1 lb. Flint	
45	

52 GREEN DRAB BODY.

2 lbs. China Clay . . .	
2 ,, Ball Clay	
4 ,, Stone	
4 ozs. Oxide Nickel . . .	
$8\frac{1}{4}$	

53 DRY SMEARING BODY.

2 lbs. Ball Clay	
3 ,, Calcined Ochre . . .	
4 ,, Oxide Manganese . .	
1 lb. Chromate Iron . . .	
10	

54 SMEARING BODY.

15 lbs. Ball Clay . . .	
$1\frac{1}{2}$,, Manganese . . .	
$4\frac{3}{4}$,, Chromate Iron . .	
$21\frac{1}{4}$	

55 SMEARING BODY.

16	lbs.	Ball Clay	
$1\frac{1}{2}$	,,	Stone	
5	,,	Oxide Manganese	
$22\frac{1}{2}$			

56 SMEARING BODY.

8	lbs.	Ball Clay	
6	,,	Calcined Ochre	
$1\frac{1}{4}$	,,	Oxide Manganese	
$1\frac{1}{2}$	,,	Chromate Iron	
$16\frac{3}{4}$			

57 DRY SMEARING BLACK.

16	lbs.	Ball Clay	
4	,,	Manganese	
4	,,	Ironstone	
8	,,	Red Clay	
32			

58 EGYPTIAN BLACK.

21	lbs.	Ball Clay	
3	,,	Red Clay	
4	,,	Manganese	
4	,,	Ironstone	
32			

59 EGYPTIAN BLACK.

30	lbs.	Blue Clay	
40	,,	Ochre	
50	,,	Manganese	
10	,,	Iron Scales	
130			

60 FAWN POROUS BODY.

40 lbs. Bradwell Clay . . .
4 „ Ball Clay . . . .
2 „ Flint . . . .

46

61 ROCKINGHAM.

4 lbs. Red Clay . . .
4 „ China Clay . . .
1 lb. Flint . . . .

9

62 PURPLE CHINA BODY.

3 lbs. Bone . . . .
$2\frac{1}{2}$ „ Ball Clay . . .
2 „ Stone . . . .
1 lb. China Clay . . .
$\frac{1}{2}$ oz. Oxide Cobalt . . .

63 SLATE CHINA BODY.

1 qt. China Body Slip . .
$\frac{1}{4}$ oz. Nickel . . . .
$\frac{1}{4}$ „ Blue Calx . .

COLOURED BODIES FOR MOSAIC PAINTING.

1 FAWN POROUS BODY FOR FOUNDATION.

40	lbs. Red Clay	This body is intended for plateaux and
4	„ Blue Clay	
2	„ Flint	
46		

wine coolers, to be ornamented with variously tinted Slips. The piece to be decorated must be kept in the green state; otherwise the Slips will not sufficiently adhere to the surface, but will chip and peel off when fired. The latter operation must only be at a moderate temperature, say in the easiest part of the Earthenware Biscuit Oven. The Slips must all be well ground.

2 WHITE SLIP.

4	lbs. Blue Clay
2	„ China Clay
2	„ Flint
1	lb. Stone
9	

3 BLUE SLIP.

20	parts White Slip, No. 2
1	part Blue Calx
21	

4 BLACK SLIP.

4	lbs.	Egyptian Black Slip, No. 15
1	lb.	White Slip, No. 2
1	,,	Blue Slip, No. 3
6		

5 ORANGE SLIP.

4	lbs.	Yellow Marl
2	,,	China Clay
1	lb.	Flint
$\frac{1}{4}$	,,	Stone
$7\frac{1}{4}$		

6 GREEN SLIP.

12	lbs.	White Slip, No. 2
1	lb.	Oxide Nickel
$\frac{1}{4}$	,,	Blue Slip, No. 3
$13\frac{1}{4}$		

ENCAUSTIC TILE COLOURS.

1 WHITE.

20	lbs.	Ball Clay
10	,,	China Clay
10	,,	Flint
5	,,	Stone
45		

2 BLUE.

25	lbs.	White Clay, as above
$1\frac{1}{4}$	,,	Blue Calx
$26\frac{1}{4}$		

3

BLACK.

12 lbs.	Egyptian Black Body, No. 15	
3 ,,	White Clay, No. 1	
3 ,,	Blue Clay, No. 2	
18		

4

GREEN.

12 lbs.	White Clay, No. 1	
1 lb.	Blue Clay, No. 2	
1 ,,	Oxide Nickel	
14		

5

YELLOW.

10 lbs.	Ball Clay	
5 ,,	China Clay	
10 ,,	Flint	
5 ,,	Stone	
15 ,,	Best Marl, ground	
45		

BODY STAINS.

The following recipes have been gathered from various sources, and are only applicable to the ordinary purpose of counteracting the yellow coloration of commercial clays. It will be considered by some that the use of glass is obsolete, and perhaps a better flux than any here given will be found in Cornish stone, used in the proportion of about five parts of stone to one of black oxide. The main consideration in the preparation of a stain is that it should be ground very well, and passed through as fine a lawn as can be procured.

I

3 lbs.	Black Oxide Cobalt	
5 ,,	Flint Glass	

2

$12\frac{1}{2}$ lbs. Black Oxide Cobalt . .		
20 ,, Ground Pitchers . .		

3

3 lbs. Black Oxide Cobalt . .		
3 ,, Ground Pitchers . .		

4

15 lbs. Black Oxide Cobalt . .	Calcine in Glost Oven.	
15 ,, Flint		
$3\frac{1}{4}$,, Red Lead . . .		

5

$6\frac{1}{2}$ lbs. Black Oxide Cobalt . .	Calcine in Glost Oven.	
5 ,, Flint		
5 ,, Flint Glass . . .		

6

3 ozs. Black Oxide Cobalt . .	Run down.	
5 lbs. Flint Glass . . .		

COLOURED DIPS.

The success of a coloured dip is dependent entirely upon the shrinkage of the body to which it is applied. If a want of agreement is found to exist, a little flint or clay added to the dip will diminish or increase its contraction as may be required.

1 AZURE.

12 qts. White Slip (unflinted). .	
4 ozs. Fluxed Blue . . .	

2 BLACK.

36 galls. Red Clay Slip . . .
25 lbs. Ironstone . . .
25 ,, Ochre . . . .
15 ,, Manganese . . .

3 BLACK FOR LAYING IN.

36 galls. Red Clay Slip . . .
30 lbs. Ironstone . . .
20 ,, Ochre . . . .
10 ,, Manganese . . .

4 BLACK FOR BANDS.

20 qts. White Body Slip, 26 ozs. .
5 lbs. Ground Iron Scales . .

5 BLACK.

12 qts. White Body Slip, 26 ozs. .
½ lb. Manganese . . . .
1¼ lbs. Ochre . . . .

6 BLACK.

20 qts. White Body Slip, 26 ozs. .
2 lbs. Nickel . . . .
4 ,, Manganese . . .
3 ,, Ochre . . . .

7 GREEN.

5 qts. Cane Slip . . . .
5 ozs. Blue Calx . . . .
1 oz. Oxide Copper . . .

8 BLUE DIP.

10 galls. White Slip (unfinted) . . . . .
4 ozs. Cobalt . . . . .

9 SKY BLUE DIP.

12 galls. White Body Slip, 26 ozs. .
4 ozs. Cobalt . . . . .

10 DRAB DIP.

12 qts. White Body Slip, 26 ozs. .
3 ozs. Manganese . . . .
3 ,, Blue Calx . . . .

11 DARK DRAB DIP

10 qts. White Body Slip, 26 ozs. .
$2\frac{1}{2}$ ozs. Manganese . . .
$2\frac{1}{2}$,, Blue Calx . . .

12 DOVE DIP.

12 qts. White Body Slip, 26 ozs. .
$1\frac{1}{2}$ lbs. Oxide Manganese . .
$\frac{1}{2}$ lb. Ochre . . . .

13 FAWN DIP.

24 qts. White Body Slip, 26 ozs. .
1 lb. Crocus Martis (finely ground)

14 FRENCH GREY DIP.

12 galls. White Body Slip, 26 ozs. .
6 ozs. Blue Calx . .

15

FRENCH GREY DIP.

4 galls. White Body Slip, 26 ozs. .
1 gall. Yellow Slip, 26 ozs. . .
4 ozs. Blue Calx . . .
4 „ Oxide Uranium . .
2 „ Manganese . . .

16

BROWN DIP.

150 lbs. Bradwell Clay . . .
100 „ Bright Hanley Marl . .
50 „ Ochre . . . .

17

GREY DIP.

36 galls. White Body Slip, 26 ozs. .
½ lb. Fluxed Blue . . .
1 „ Manganese . . .

18

GREEN DIP.

36 galls. White Body Slip, 26 ozs. .
48 ozs. Oxide Chrome, ground and washed . . . .

19

GREEN DIP.

5 qts. White Body Slip, 26 ozs. .
4 ozs. Oxide Copper . . .
10 „ „ Nickel . . .

20

GREEN DIP.

4 qts. White Body Slip, 26 ozs. .
4 ozs. Oxide Nickel . . .
1 oz. Blue Calx . . . .

21 **OLIVE GREEN DIP.**

4 qts. White Body Slip, 26 ozs. .	
12 ozs. Oxide Nickel . . .	
10 „ Fluxed Blue . . .	
1 oz. Iron Scales . . .	

22 **FLESH-COLOURED DIP.**

8 qts. White Body Slip, 26 ozs. .	
4 „ Red Clay, 26 ozs. . .	

23 **ASH-COLOURED DIP.**

6 lbs. C. C. Clay	
2 ozs. Fluxed Blue . . .	

24 **MOCHA STAIN.**

12 lbs. Calcined Nickel . . .	To be well ground and mixed with body according to shade of colour desired.
6 „ Black Pitchers . .	
6 „ Iron Scales . . .	
2 ozs. Flint Glass . . .	
6 „ Blue Calx	

25 **"BLACK JACK'S MOCO" STAIN.**

6 lbs. Black Pitchers . . .	To be well ground and mixed with body to required strength.
3 „ Ironstone	
3 „ Oxide Nickel . . .	
3 „ Flint Glass . . .	
1½ „ Fluxed Blue . . .	

26 **LILAC DIP.**

24 qts. White Slip, 26 ozs. . .	
1 lb. Crocus Martis (Red Oxide Iron)	
1 oz. Blue Calx	

27 MULBERRY DIP.

20 qts. Red Clay, 26 ozs. . .
1 pt. Nickel, 27 ozs. . . .
2 ozs. Flint Glass . . .

28 DARK MULBERRY DIP.

20 qts. Red Slip, 26 ozs. . .
1 qt. Nickel, 27 ozs. . . .
2 ozs. Flint Glass . . .

29 PINK DIP.

13 qts. Body Slip, 26 ozs. . .
3 „ Whiting, 26 ozs. . .
3 „ China Stone, 32 ozs. . .
3 „ U. G. Crimson, 32 ozs . .
3 „ Common Glaze, 28 ozs. .

30 DARK RED DIP.

3 qts. White Body Slip, 26 ozs. .
2 „ Red Clay, 26 ozs. . .
4 ozs. Blue Calx . . . .

31 RED DIP.

3 qts. Red Clay, 26 ozs. . .
$\frac{1}{4}$ oz. Copperas . . . .

32 PINK DIP.

2 qts. Ball Clay, 24 ozs. . .
1 qt. U. G. Pink, 32 ozs. . .
1 „ Whiting, 28 ozs. . .

33 MAROON DIP.

7 lbs. Blue Clay	
$2\frac{1}{4}$ „ U. G. Pink . . .	
6 ozs. Sal Ammoniac . . .	

34 BLUSH DIP.

10 galls. White Slip (unflinted), 26 ozs.	
10 ozs. Sal Ammoniac . . .	
2 „ U. G. Crimson . . .	

35 PURPLE DIP.

40 qts. Blue Clay	
1 oz. Blue Calx	
2 ozs. Manganese . . .	

36 TURQUOISE DIP.

5 lbs. Ball Clay	Calcine in Glost Oven and grind.
5 „ Oxide Zinc . .	
3 „ Blue Calx	

40 pts. Body Slip	
1 pt. Stain, as above, 32 ozs. .	

37 BLUE DIP.

4 lbs. China Stone . . .	
1 lb. China Clay . . .	
3 pts. Bone Slip	
3 „ Ball Slip	
10 ozs. Cobalt Blue . . .	

38

GREEN DIP.

5 qts. Cane Slip . . . .
5 ozs. Ground Zaffre . . .
1 oz. Copper Scales . . .

39

OLIVE DIP.

12 qts. Cane Slip . . .
½ oz. Zaffre . . . .
2 ozs. Copper Scales . . .

40

GREEN DIP.

1 qt. Blue, No. 37 . . .
1½ ozs. Ground Nickel . . .

CHAPTER II.

GLAZES.

In the preparation of a glaze much depends upon the proper fritting of the soluble materials. Some few fritts contain lead or flint glass, and these should not be melted in the fritt kiln, but should be put in well-flinted saggers in the Glost Oven. Care should also be taken to ascertain, by a series of trials, the proper temperature at which a glaze should be fired: a very common error is to over-fire the glaze in attempting to secure brilliancy. The result is the exact opposite: the glaze is impoverished, its finer constituents are volatilised, and a harsh granular surface is left. At the proper fire a glaze should remain on all the higher projections of the ware, and should appear rich and mellow to the eye and touch.

CHINA GLAZES.

1 LONGPORT CHINA GLAZE.

Fritt—	150	lbs.	Borax
	90	,,	Stone
	115	,,	Flint
	48	,,	Whiting
	19	,,	China Clay
Glaze—	314	,,	Fritt
	157	,,	Stone
	118	,,	White Lead
	34	,,	Flint

2 LONGPORT SEMI-CHINA GLAZE.

Fritt—	140	lbs.	Borax
	80	,,	Stone
	115	,,	Flint
	70	,,	Whiting
	25	,,	China Clay
Glaze—	350	,,	Fritt
	210	,,	China Stone
	135	,,	White Lead
	45	,,	Flint
	9½	ozs.	Stain

3 ALCOCK'S CHINA GLAZE.

Fritt—	68	lbs.	Borax	Body Nos. 2, 3, 4.
	56	,,	China Stone	
	45	,,	Flint	
	45	,,	Whiting	
	34	,,	China Clay	
Glaze—	265	,,	Fritt	
	52	,,	Flint	
	53	,,	Stone	
	79	,,	Lead	

4 CHINA GLAZE.

Fritt—	120	lbs.	Borax	Body Nos. 5 and 6.
	51	,,	Flint	
	51	,,	Stone	
	21	,,	Whiting	
Glaze—	130	,,	Fritt	
	51	,,	Stone	
	48	,,	Lead	

5 CHINA GLAZE.

Fritt—	121	lbs.	Borax	Body Nos. 7, 8, 9.
	66	,,	Whiting	
	66	,,	Flint	
	81	,,	Stone	
	51	,,	China Clay	
Glaze—	270	,,	Fritt	
	50	,,	White Lead	
	50	,,	Flint	
	50	,,	Stone	

6 CHINA GLAZE.

Fritt—	138	lbs.	Borax	Body No. 10.
	140	,,	Stone	
	130	,,	Flint Glass	
	122	,,	Flint	
Glaze—	520	,,	Fritt	
	120	,,	White Lead	

7 CHINA GLAZE.

Fritt—	35	lbs.	Borax	
	20	,,	Spar	
	20	,,	Stone	
	10	,,	China Clay	
Glaze—	80	,,	Fritt	
	30	,,	White Lead	

8 CHINA GLAZE.

Fritt—	50	lbs.	Borax	Body No. 27.
	80	,,	Stone	
	33	,,	Whiting	
	39	,,	Flint	
Glaze—	520	,,	Fritt	
	100	,,	White Lead	

9 CHINA GLAZE.

Fritt—	70	lbs.	Borax	Body Nos. 11 and 12.
	60	,,	Stone	
	20	,,	Whiting	
	20	,,	Flint	
Glaze—	165	,,	Fritt	
	90	,,	White Lead	

10 CHINA GLAZE.

Fritt—	140	lbs.	Borax	Body No. 13.
	160	,,	Stone	
	100	,,	Flint	
Glaze—	352	,,	Fritt	
	70	,,	White Lead	

11 CHINA GLAZE.

Fritt—	45	lbs.	Borax
	60	,,	Stone
	10	,,	Flint
Glaze—	112	,,	Fritt
	40	,,	White Lead

12 CHINA GLAZE.

Fritt—	95	lbs.	Borax
	125	,,	Stone
	35	,,	Flint
Glaze—	250	,,	Fritt
	72	,,	White Lead

13
CHINA GLAZE.

Fritt—	53	lbs.	Borax	Body No. 14.
	24	,,	Stone	
	30	,,	Felspar	
	20	,,	Flint	
	10	,,	Whiting	
Glaze—	90	,,	Fritt	
	30	,,	Stone	
	30	,,	White Lead	

14
CHINA GLAZE.

Fritt—	40	lbs.	Borax	Body No. 15.
	50	,,	Stone	
	30	,,	Flint	
	30	,,	Flint Glass	
Glaze—	147	,,	Fritt	
	30	,,	White Lead	

15
SPODE'S GLAZE.

Fritt—	40	lbs.	Borax	Body No. 16.
	170	,,	Stone	
	100	,,	Flint	
	20	,,	Flint Glass	
Glaze—	325	,,	Fritt	
	40	,,	White Lead	

16
CHINA GLAZE.

Fritt—	30	lbs.	Stone	Run down in flinted saggers at bottom of Glost Oven.
	15	,,	Flint	
	77½	,,	Red Lead	
	6	,,	Carbonate Soda	
Glaze—	15	,,	Fritt	
	12	,,	Flint Glass	
	10	,,	White Lead	

17 CHINA GLAZE.

Fritt—128	lbs.	Borax	Body No. 29.
158	,,	Stone	
94	,,	China Clay	
125	,,	Flint	
62	,,	Whiting	
$1\frac{1}{2}$	,,	Pearl Ash	
3	,,	Nitrate Potash	
20	,,	Carbonate Soda	
Glaze—443	,,	Fritt	
10	,,	Flint	
50	,,	Whiting	
10	,,	China Clay	
17	,,	Stone	
141	,,	White Lead	

18 SPECIAL CHINA GLAZE.

Fritt—110	lbs.	Borax	Body No. 37.
66	,,	Stone	
50	,,	Flint	
33	,,	Whiting	
30	,,	China Clay	
Glaze—230	,,	Fritt	
34	,,	Stone	
28	,,	Flint	
28	,,	White Lead	

19 FELSPAR CHINA GLAZE.

Fritt—20	lbs.	Sand	Body Nos. 17, 30.
20	,,	Borax	
12	,,	Stone	
20	,,	Felspar	
10	,,	Whiting	
3	,,	Arsenic	
Glaze—83	,,	Fritt	
12	,,	Stone	
32	,,	White Lead	

20 CHINA GLAZE.

Fritt—100	lbs.	Stone	Body Nos. 17, 30.
90	„	Flint	
100	„	Whiting	
150	„	Borax	
28	„	China Clay	
24	„	Carbonate Soda	
Glaze—360	„	Fritt	
200	„	Stone	
60	„	Flint	
100	„	White Lead	
30	„	Felspar	

21 CHINA GLAZE.

Fritt—207	lbs.	Borax	Body No. 29.
60	„	China Clay	
100	„	Stone	
80	„	Flint	
80	„	Whiting	
Glaze—520	„	Fritt	
59	„	White Lead	
59	„	Stone	
59	„	Flint	

22 CHINA GLAZE.

Fritt—200	lbs.	Stone
100	„	Flint
48	„	Whiting
28	„	China Clay
135	„	Borax
Glaze—500	„	Fritt
25	„	Whiting
42	„	White Lead

23 CHINA GLAZE.

Fritt—	180 lbs.	Borax	
	160 ,,	Stone	
	80 ,,	Flint	
	80 ,,	Whiting	
	30 ,,	China Clay	
	24 ,,	Carbonate Soda	
Glaze—	540 ,,	Fritt	
	80 ,,	Flint	
	80 ,,	White Lead	

24 CHINA GLAZE.

Fritt—	80 lbs.	Stone	
	90 ,,	White Lead	
	76 ,,	Borax	
	65 ,,	Flint	
	44 ,,	Carbonate Soda	
	10 ,,	Oxide Tin	
	2 ,,	Enamel Blue	
Glaze—	320 ,,	Fritt	
	100 ,,	White Lead	
	100 ,,	Stone	

25 MASON'S CHINA GLAZE.

Fritt—	35 lbs.	Borax	
	58 ,,	Stone	
	22 ,,	Flint	
	22 ,,	Flint Glass	
Glaze—	125 ,,	Fritt	
	75 ,,	White Lead	

26 CHINA GLAZE.

Fritt	60	lbs.	Borax
	80	,,	Stone
	50	,,	Whiting
	40	,,	Felspar
	10	,,	Nitre
	10	,,	Flint
Glaze	100	,,	Fritt
	45	,,	Stone
	32	,,	White Lead

27 FRENCH GLAZE.

Fritt	120	parts	Felspar
	200	,,	Borax
	150	,,	Flint
	40	,,	China Clay
	80	,,	Whiting
Glaze	250	,,	Fritt
	65	,,	White Lead
	65	,,	Felspar

28 CHINA GLAZE.

Fritt	135	lbs.	Felspar
	75	,,	Borax
	37½	,,	Paris White
	30	,,	Flint
Glaze	540	,,	Fritt
	108	,,	China Clay

29 PRINTED GLAZE FOR CHINA.

Fritt	225	lbs.	Felspar
	90	,,	Borax
	45	,,	Paris White
	45	,,	Flint
Glaze	337	,,	Fritt
	67	,,	China Clay

30 WHITE GLAZE.

Fritt—202 lbs.	Felspar	. . .	
112 ,,	Borax	. . .	
56 ,,	Paris White	. .	
45 ,,	Flint	. . .	
Glaze—367 ,,	Fritt	. . .	
30 ,,	China Clay	. .	
12 ,,	White Lead	. .	

IRONSTONE GLAZES.

1 LONGPORT OLD STONE GLAZE.

100 lbs.	Lead	. . .	Body Nos. 2, 3, 11, 16, 17.
45 ,,	Stone	. . .	
25 ,,	Flint	. . .	
15 ,,	China Clay	. .	
5 ,,	Flint Glass	. .	

This is one of the oldest and most successful unfritted glazes known in the Potteries.

2 IRONSTONE GLAZE.

Fritt—38 lbs.	Tincal	. . .	Body Nos. 5, 6, 12.
25 ,,	Stone	. . .	
20 ,,	Flint	. . .	
18 ,,	Whiting	. . .	
15 ,,	China Clay	. .	
Glaze—160 ,,	Fritt	. . .	
32 ,,	Stone	. . .	
32 ,,	Flint	. . .	
57 ,,	White Lead	. .	

3 IRONSTONE GLAZE.

Fritt—18 lbs. Borax .
40 „ Stone
20 „ Flint
20 „ Glass . .
Glaze—To each 140 lbs. Fritt add,
75 lbs. White Lead . .

Body Nos. 7, 13.

4 IRONSTONE GLAZE.

Fritt—30 lbs. Borax . . .
70 „ Stone . . .
Glaze—To above add,
90 lbs. Stone . . .
50 „ Flint . . .
40 „ Whiting . . .
150 „ White Lead . .

Body No. 8.

5 SEMI-PORCELAIN GLAZE.

Fritt—100 lbs. Borax . . .
65 „ Stone . . .
55 „ Whiting . . .
60 „ Flint . . .
20 „ China Clay . .
Glaze—200 „ Fritt . . .
120 „ Stone . . .
60 „ White Lead . .

6 STONE GLAZE.

Fritt—135 lbs. Borax . . .
112 „ Stone . . .
90 „ Flint . . .
90 „ Whiting . . .
68 „ China Clay . .
Glaze—530 „ Fritt . . .
106 „ Stone . . .
158 „ White Lead . .
104 „ Flint . . .

7 IRONSTONE GLAZE.

Fritt—90	lbs.	Stone	
20	,,	Salts of Soda	
Glaze—33	,,	Fritt	
33	,,	Stone	
85	,,	Whiting	
80	,,	White Lead	

EARTHENWARE GLAZES.

1 BEST WHITE GLAZE.

Fritt—140	lbs.	Borax	Body No. 1.
80	,,	Stone	
115	,,	Flint	
70	,,	Whiting	
25	,,	China Clay	
Glaze—350	,,	Fritt	
210	,,	Stone	
135	,,	White Lead	
45	,,	Flint	
9½	ozs.	Stain	

2 No. 8 GLAZE.

Fritt—100	lbs.	Borax	Body No. 2.
50	,,	Stone	
40	,,	Flint	
40	,,	Whiting	
30	,,	China Clay	
Glaze—180	,,	Fritt	
36	,,	Stone	
36	,,	Flint	
50	,,	White Lead	
9	ozs	Stain	

3 MATT BLUE GLAZE.

Fritt—50	lbs.	Tineal	
105	,,	Stone	
55	,,	Flint	
20	,,	Oxide Tin	
12	,,	White Lead	

Glaze—To above charge of Fritt add 10 lbs. White Lead, and "dip thin."

4 COMMON PERSIAN GLAZE.

Fritt—80	lbs.	Tineal	
90	,,	Stone	
60	,,	Flint	
40	,,	Whiting	
16	,,	China Clay	Body Nos. 3, 4, 6, 15, 17.
Glaze—250	,,	Fritt	
95	,,	Stone	
25	,,	Whiting	
140	,,	White Lead	

5 PRINTED GLAZE.

Fritt—60	lbs.	Tineal	
38	,,	Flint	
28	,,	Whiting	
12	,,	China Clay	Body No. 6.
Glaze—170	,,	Fritt	
40	,,	Stone	
56	,,	White Lead	

6 GLAZE FOR PINK.

Fritt—	158	lbs.	Borax
	70	,,	Stone
	75	,,	Flint
	70	,,	Whiting
	55	,,	China Clay
	12	,,	Soda
Glaze—	100	,,	Fritt
	20	,,	Stone
	20	,,	Flint
	80	,,	White Lead

7 EARTHENWARE GLAZE.

Fritt—	70	lbs.	Tincal
	100	,,	Stone
	50	,,	Flint
	20	,,	Whiting
Glaze—	100	,,	Fritt
	25	,,	White Lead

8 EARTHENWARE GLAZE.

Fritt—	60	lbs.	Borax
	100	,,	Stone
	20	,,	Flint
	30	,,	Whiting
	10	,,	China Clay
Glaze—	300	,,	Fritt
	180	,,	Stone
	120	,,	White Lead
	70	,,	Flint

9 **EARTHENWARE GLAZE.**

Fritt—	120	lbs.	Tincal
	180	,,	Stone
	100	,,	Flint
	60	,,	Whiting
	10	,,	China Clay
Glaze—	300	,,	Fritt
	100	,,	White Lead

10 **EARTHENWARE GLAZE.**

Fritt—	60	lbs.	Borax
	80	,,	Stone
	20	,,	Flint
	5	,,	Whiting
	5	,,	China Clay
Glaze—	300	,,	Fritt
	160	,,	Stone
	30	,,	Flint
	160	,,	White Lead

11 **DAISY GLAZE.**

Fritt—	90	lbs.	Borax
	50	,,	Stone
	50	,,	Flint
	20	,,	Whiting
Glaze—To above add,			
	70	lbs.	Stone
	70	,,	White Lead

12 FRENCH WHITE GLAZE.

Fritt—70	lbs.	Tincal	. . .
70	,,	Stone	. . .
70	,,	Flint	. . .
40	,,	Whiting	. . .
30	,,	China Clay	. .
Glaze—To above add,			
60	lbs.	Stone	. . .
100	,,	White Lead	. .

13 PERSIAN GLAZE.

Fritt—84	lbs.	Tincal	. . .
96	,,	Stone	. . .
64	,,	Flint	. . .
40	,,	Whiting	. . .
16	,,	China Clay	. .
Glaze—240	,,	Fritt	. . .
96	,,	Stone	. . .
140	,,	White Lead	. .

14 FLOW GLAZE.

Fritt—40	lbs.	Tincal	. . .
50	,,	Stone	. . .
10	,,	Felspar	. . .
Glaze—85	,,	Fritt	. . .
40	,,	Flint	. . .
40	,,	Stone	. . .
10	,,	China Clay	. .
90	,,	White Lead	. .

15 EARTHENWARE GLAZE.

Fritt—	76	lbs.	Borax
	71	"	Tincal
	81	"	Flint
	94	"	Stone
	81	"	Whiting
	33	"	China Clay
Glaze—	336	"	Fritt
	200	"	Stone
	26	"	Flint
	78	"	White Lead

16 BEST C. C. GLAZE.

Fritt—	85	lbs.	Borax
	50	"	Flint
	50	"	Stone
	20	"	Whiting
Glaze—	280	"	Fritt
	91	"	Stone
	15	"	Flint
	190	"	White Lead

17 MAYER'S GLAZE.

Fritt—	70	lbs.	Tincal
	50	"	Stone
	40	"	Whiting
	32	"	China Clay
	25	"	Flint Glass
	10	"	White Lead
Glaze—	90	"	Fritt
	18	"	Stone
	18	"	Flint
	25	"	White Lead

18 ALCOCK'S GLAZE.

Fritt—120	lbs.	Borax	
65	„	Stone	
45	„	Whiting	
50	„	Flint	
25	„	China Clay	
Glaze—160	„	Fritt	
40	„	Stone	
30	„	Flint	
60	„	White Lead	

19 HANLEY GLAZE.

Fritt—105	lbs.	Borax	
100	„	Stone	
35	„	White Lead	
40	„	Flint	
18	„	Whiting	
Glaze—160	„	Fritt	
24	„	Flint	
30	„	Stone	
80	„	White Lead	

20 FLOW GLAZE.

Fritt—50	lbs.	Stone	
60	„	Carbonate Soda	
10	„	Fluor-spar	
Glaze—85	„	Fritt	
40	„	Stone	
40	„	Flint	
10	„	China Clay	
90	„	White Lead	

21 EARTHENWARE GLAZE.

Fritt—	105 lbs.	Tincal	. . .
	100 ,,	Stone	. . .
	50 ,,	Flint	. . .
	20 ,,	Whiting	. .
Glaze—	100 ,,	Fritt	. . .
	25 ,,	White Lead	.

22 EARTHENWARE GLAZE.

Fritt—	60 lbs.	Tincal	. . .
	100 ,,	Stone	. . .
	50 ,,	Flint	. . .
	20 ,,	Whiting	. . .
Glaze—	100 ,,	Fritt	. . .
	250 ,,	White Lead	.

23 EARTHENWARE GLAZE.

Fritt—	67 lbs.	Tincal	. . .
	50 ,,	Flint	. . .
	100 ,,	Stone	. . .
	20 ,,	Whiting	. . .
Glaze—	180 ,,	Fritt	. . .
	40 ,,	White Lead	. .

24 EARTHENWARE GLAZE.

Fritt—	120 lbs.	Tincal	. . .
	102 ,,	Flint	
	54 ,,	Whiting	
	36 ,,	China Clay	
Glaze—	200 ,,	Fritt	.
	100 ,,	Stone	. .
	10 ,,	Felspar	. . .
	65 ,,	White Lead	

25 **FELSPATHIC GLAZE.**

Fritt—	100	lbs.	Felspar	
	46	,,	Bicarbonate Soda	
	10	,,	White Lead	
	10	,,	French Chalk	
	3	,,	China Clay	
Glaze—	150	,,	Fritt	
	80	,,	Felspar	
	46	,,	White Lead	

26 **RAW GLAZE.**

100	lbs.	Felspar	Ground for use.
110	,,	White Lead	
10	,,	Whiting	

27 **EARTHENWARE GLAZE.**

Fritt—	160	lbs.	Borax	Body Nos. 11 and 17.
	80	,,	Flint	
	80	,,	Stone	
	20	,,	China Clay	
	60	,,	Whiting	
Glaze—	200	,,	Fritt	
	200	,,	Stone	
	120	,,	White Lead	

28 **EARTHENWARE GLAZE.**

Fritt—	40	lbs.	Borax
	25	,,	Stone
	20	,,	Flint
	18	,,	Whiting
	15	,,	China Clay
Glaze—	160	,,	Fritt
	32	,,	Stone
	32	,,	Flint
	75	,,	White Lead

29 C. C. GLAZE.

Fritt—	100 lbs.	Borax	
	100 ,,	Stone	
	50 ,,	Flint	
Glaze—	100 ,,	Fritt	
	100 ,,	White Lead	

30 COMMON GLAZE.

Fritt—	120 lbs.	Tincal	Body Nos. 22 and 23.
	55 ,,	Flint	
	70 ,,	Stone	
	40 ,,	Whiting	
	20 ,,	China Clay	
Glaze—	180 ,,	Fritt	
	50 ,,	Stone	
	70 ,,	White Lead	

31 RAW WHITE GLAZE.

100 lbs.	White Lead	Grind for use.
50 ,,	Stone	
25 ,,	Flint	
10 ,,	Whiting	
10 ,,	China Clay	

32 PRINTED GLAZE.

Fritt—	240 lbs.	Stone	Body No. 12.
	90 ,,	Boracic Acid	
	35 ,,	Carbonate Soda	
	60 ,,	Whiting	
Glaze—	720 ,,	Fritt	
	314 ,,	Stone	
	165 ,,	White Lead	

33 GRANITE GLAZE.

Fritt—	135	lbs.	Borax	Body No. 18.
	112	,,	Stone	
	90	,,	Flint	
	90	,,	Whiting	
	68	,,	China Clay	
Glaze—	530	,,	Fritt	
	104	,,	Flint	
	106	,,	Stone	
	158	,,	Lead	

34 PRINTED GLAZE.

Fritt—	90	lbs.	Boracic Acid
	63	,,	China Clay
	90	,,	Whiting
	53	,,	Carbonate Soda
	159	,,	Flint
Glaze—	500	,,	Fritt
	174	,,	Stone
	200	,,	White Lead

35 PRINTED GLAZE.

Fritt—	240	lbs.	Stone
	35	,,	Carbonate Soda
	60	,,	Whiting
	90	,,	Boracic Acid
Glaze—	720	,,	Fritt
	314	,,	Stone
	165	,,	White Lead

36 PRINTED GLAZE.

Fritt—	65 lbs.	Tincal	
	85 ,,	Stone	
	45 ,,	Flint	
	25 ,,	Whiting	
Glaze—	170 ,,	Fritt	
	20 ,,	Stone	
	45 ,,	White Lead	
	5 ,,	Flint	

37 PRINTED GLAZE.

Fritt—	100 lbs.	Borax	
	50 ,,	Stone	
	40 ,,	Flint	
	40 ,,	Whiting	
	30 ,,	China Clay	
Glaze—	180 ,,	Fritt	
	36 ,,	Stone	
	50 ,,	White Lead	
	36 ,,	Flint	

38 PRINTED GLAZE.

Fritt—	100 lbs.	Borax	
	75 ,,	Stone	
	60 ,,	Flint	
	60 ,,	Whiting	
	45 ,,	China Clay	
Glaze—	200 ,,	Fritt	
	50 ,,	Stone	
	60 ,,	White Lead	
	40 ,,	Flint	

39 BEST WHITE GLAZE.

Fritt—	80	lbs.	Borax
	104	,,	Stone
	62	,,	Flint
	36	,,	Carbonate Soda
	104	,,	Whiting
	134	,,	Boracic Acid
	40	,,	China Clay
Glaze—	270	,,	Fritt
	150	,,	Stone
	98	,,	White Lead
	70	,,	Flint

40 MATT BLUE GLAZE.

Fritt—	155	lbs.	Stone
	97	,,	Boracic Acid
	95	,,	Carbonate Soda
	52	,,	China Clay
Glaze—	370	,,	Fritt
	94	,,	Stone
	104	,,	Flint
	62	,,	Whiting
	180	,,	White Lead

41 EARTHENWARE PRINTED GLAZE.

Fritt—	120	lbs.	Borax
	56	,,	Stone
	55	,,	Whiting
	60	,,	Flint
	19	,,	China Clay
	15	,,	Carbonate Soda
Glaze—	300	,,	Fritt
	60	,,	Flint
	135	,,	Stone
	115	,,	White Lead

42 ## BORAX GLAZE FOR PINK.

Fritt—65	lbs.	Borax	. .
40	,,	Flint	.
25	,,	China Clay	
25	,,	Whiting	.
15	,,	Stone	.
12	,,	Carbonate Soda	.
Glaze—60	,,	Fritt	. . .
12	,,	Stone	. . .
12	,,	Flint	. .
24	,,	White Lead	. .

43 ## TINCAL GLAZE.

Fritt—70	lbs.	Tincal	. . .
50	,,	Flint	. . .
100	,,	Stone	. . .
20	,,	Whiting	. . .
Glaze—80	,,	Fritt	. . .
20	,,	White Lead	. .

44 ## TINCAL GLAZE.

Fritt—70	lbs.	Tincal	. . .
80	,,	Stone	. . .
60	,,	Flint	. .
20	,,	Whiting	. .
10	,,	Carbonate Soda	.

Glaze—To the above add,

60	lbs.	Stone	. . .
60	,,	White Lead	. .
4	,,	Borax	. . .

45 BORAX GLAZE.

Fritt—62	lbs.	Borax	
40	,,	Flint	
25	,,	China Clay	
25	,,	Whiting	
15	,,	Stone	
12	,,	Carbonate Soda	
Glaze—150	,,	Fritt	
30	,,	Flint	
30	,,	Stone	
60	,,	White Lead	

46 BORACIC ACID GLAZE.

Fritt—40	lbs.	Boracic Acid	
40	,,	Whiting	
50	,,	Stone	
30	,,	Flint	
10	,,	China Clay	
Glaze—200	,,	Fritt	
50	,,	Stone	
40	,,	White Lead	
2	,,	Borax	

47 BORACIC ACID GLAZE.

Fritt—20	lbs.	Boracic Acid	
40	,,	Carbonate Soda	
15	,,	Whiting	
4	,,	Nitre	
30	,,	Flint	
20	,,	Stone	
5	,,	China Clay	
Glaze—80	,,	Fritt	
50	,,	Stone	
30	,,	White Lead	

48 ## BORAX GLAZE.

Fritt—66 lbs. Borax . . .
30 ,, Flint . . .
20 ,, China Clay . .
37 ,, Stone . . .
30 ,, Whiting . . .

Glaze—60 ,, Fritt . . .
15 ,, Flint . . .
15 ,, Stone . . .
25 ,, White Lead . .

49 ## WHITE GLAZE.

Fritt—100 lbs. Stone . . .
20 ,, Flint Glass . .
10 ,, Flint . . .
10 ,, Borax . . .

Glaze—100 ,, Fritt . . .
50 ,, White Lead . .

50 ## FRITT.

20 lbs. Borax . . .
200 ,, Stone . . .
50 ,, Flint . . . Run down in saggers.
50 ,, Whiting . . .
20 ,, White Lead . .
80 ,, Soda . . .

51 ## WHITE GLAZE.

24 lbs. Fritt, No. 50 . .
60 ,, Stone . . .
55 ,, Flint . .
70 ,, White Lead .

52 C. C. GLAZE.

80	lbs.	Fritt, No. 50	
120	,,	Stone	
30	,,	Flint	
15	,,	Whiting	
145	,,	White Lead	

53 PRINTED GLAZE.

160	lbs.	Fritt, No. 50	
80	,,	Stone	
50	,,	Flint	
15	,,	Whiting	
100	,,	White Lead	

54 PRINTED GLAZE.

Fritt—108	lbs.	Borax	
90	,,	Stone	
50	,,	China Clay	
12	,,	Flint	
12	,,	Whiting	
Glaze—80	,,	Fritt	
120	,,	Stone	
30	,,	Flint	
16	,,	Whiting	
140	,,	White Lead	

55 PRINTED GLAZE.

Fritt—200	lbs.	Stone	
50	,,	Flint	
50	,,	Whiting	Run down in saggers.
20	,,	Borax	
20	,,	White Lead	
80	,,	Carbonate Soda	
Glaze 24	,,	Fritt	
40	,,	Stone	
25	,,	Flint	
5	,,	Borax	
140	,,	White Lead	

56 COMMON GLAZE.

Fritt—94	lbs.	Stone	
25	„	Boracic Acid	
35	„	Carbonate Soda	
10	„	Whiting	
8	„	China Clay	
30	„	Flint	
6	„	Red Lead	
Glaze—190	„	Fritt	
20	„	Stone	
10	„	White Lead	

GLAZES WITHOUT LEAD.

A good leadless glaze has long been sought after by potters, but it cannot be said that the right combination has yet been found. At a very hard fire a felspar glaze approaching the continental hard paste may be used, but this entirely deprives English earthenware of its simplicity and cheapness. Leadless glazes are notorious for bad working properties and for other faults. The following recipes are in use, but it is not claimed that they are perfect:—

1 COCKSON'S GLAZE.

90	lbs.	Borax	To be well fritted, and then ground for use.
40	„	Felspar	
38	„	Flint	
36	„	Flint Glass	

2 LAKIN'S GLAZE.

60	lbs.	Borax	To be fritted and ground, and to be dipped very thin.
60	„	Flint	
36	„	Stone	
4	„	Oxide Tin	

3 ROSE'S GOLD MEDAL LEADLESS GLAZE.

27 lbs.	Felspar	. . . .	This mixture to be fritted, and then add three times the weight of fritt of Calcined Borax.
18 „	Borax	. . . .	
4 „	Lynn Sand	. . .	
3 „	China Clay	. . .	
3 „	Nitre	. . . .	
3 „	Carbonate Soda	. . .	

4 CHINA GLAZE WITHOUT LEAD.

Fritt—	405 lbs.	Felspar	. . .
	225 „	Borax	. . .
	112 „	Whiting	. . .
	90 „	Flint	. . .
Glaze—	675 „	Fritt	. . .
	135 „	China Clay	. .

MISCELLANEOUS GLAZES.

1 SAGGER WASH.

210 lbs.	White Lead	. . .
120 „	Stone	. . . .
60 „	Flint	. . . .

2 SAGGER WASH.

150 lbs.	White Lead	. . .
110 „	Stone	. . . .
90 „	Flint	. . . .

3 WASH FOR EARTHENWARE SAGGERS.

200 lbs.	White Lead	. . .
100 „	Stone	. . . .
50 „	Flint	. . . .

COLOURED GLAZES.

There is probably not the demand now for coloured glazes that there once was, but the following recipes, culled mainly from the books of those who have passed away, may prove suggestive to the more scientific mind of the modern potter. These colours evidently constitute the palette of a kind of glaze kiln majolica.

1 AMBER GLAZE FOR BRISTOL STONEWARE.

110 lbs.	White Lead	
15 „	Flint	
$7\frac{1}{2}$ „	Crocus Martis	

2 AMBER GLAZE.

110 lbs.	White Lead	
15 „	Flint	
5 „	Crocus Martis	

3 DARK GREEN MAJOLICA.

18 lbs.	Red Lead	
10 „	Flint	
5 „	Borate Lime	
5 „	Felspar	
$2\frac{3}{4}$ „	Oxide Copper	

4 MAZARINE GLAZE FOR TILES.

8 lbs.	White Lead	
1 lb.	Flint	
$\frac{1}{2}$ „	Oxide Cobalt	

5
MULBERRY GLAZE.

8 lbs. White Lead . . .
1 lb. Flint . . . .
½ „ Oxide Manganese .

6
GLAZE FOR COLOURING.

Fritt—24 lbs. Stone . . .
9 „ Boracic Acid . .
3½ „ Carbonate Soda .
6 „ Whiting . . .
Glaze—72 „ Fritt . . .
31 „ Stone . . .
16½ „ White Lead . .

7
PEA GREEN.

9 lbs. Glaze, No 6 . . .
1 lb. White Lead . . .
½ „ Carbonate Copper . .

Grind for use.

8
PALE BRONZE.

9 lbs. Glaze, No. 6 . . .
1 lb. White Lead . . .
½ „ Crocus Martis . . .
¼ „ Carbonate Copper . .

Grind for use.

9
STRONG BRONZE.

9 lbs. Glaze, No. 6 . . .
2 „ White Lead . . .
½ lb. Crocus Martis . . .
1 „ Carbonate Copper . .

Grind for use.

10 ORANGE.

11 lbs. White Lead . . .	Grind for use.
½ lb. Flint . .	
½ „ Crocus Martis . . .	

11 MAZARINE.

8 lbs. Glaze, No. 6 . . .	Grind for use.
1 lb. White Lead . . .	
½ „ Prepared Oxide Cobalt .	

12 GOLDEN BUFF.

9 lbs. Glaze, No. 6 . . .	Grind for use.
1 lb. White Lead . . .	
1 „ Buff Base	

Buff Base—

3 lbs. Oxide Tin . . .	Spread on plates and calcine easy in Glost Oven. Wash well.
6 „ Crude Antimony . .	
9 „ Red Lead . . .	
2½ „ Sulphate Iron . . .	

13 CHESTNUT BROWN.

9 lbs. Glaze, No. 6 . . .
1 lb. White Lead . . .
1 „ Base . . . .

Base—

4½ lbs. Oxide Zinc . . .	Calcine at Biscuit heat, and wash well.
2 „ Bichromate Potash . .	
1 lb. Crocus Martis . .	

14 DARK GREEN.

9 lbs. Glaze, No. 6 . . .
1 lb. White Lead . . .
1 „ Carbonate Copper . .

15 STRONG FAWN GLAZE.

9 lbs. Glaze, No. 6	. . .	
1 lb. White Lead	. .	
$\frac{1}{4}$,, Base	. .	

Base—

4 lbs. Oxide Zinc	. . .	Calcine in Biscuit Oven.
2 ,, Bichromate Potash	. .	
1 lb. Crocus Martis	. . .	
2 lbs. Alumina	. . . .	
$\frac{1}{2}$ lb. Flint	. . . .	

16 RED BROWN.

9 lbs. Glaze, No. 6	. . .	
$1\frac{1}{2}$,, White Lead	. . .	
1 lb. Base, No. 15	. . .	

17 CHOCOLATE BROWN.

5 lbs. Glase, No. 6	. . .	
5 ,, White Lead	. . .	
1 lb. Black Oxide Manganese	.	

18 BLUE GREEN.

9 lbs. Glaze, No. 6	. . .	Grind for use.
2 ,, White Lead	. . .	
$\frac{1}{4}$ lb. Prepared Oxide Cobalt	.	
1 ,, Carbonate Copper	. .	

19 SEPIA BROWN.

3 lbs. Glaze, No. 6	. . .	Grind for use.
$2\frac{1}{2}$,, White Lead	. . .	
$\frac{1}{2}$ lb. Black Oxide Manganese	.	

20 GOLDEN YELLOW.

5 lbs.	Glaze, No. 6	Grind for use.
5 ,,	White Lead	
2 ,,	Base below	

Base—

3 lbs.	Oxide Tin	Spread on Heeler Saggers, and fire in Biscuit Oven with plenty of air.
6 ,,	Crude Antimony	
9 ,,	Red Lead	
14 ,,	Common Alum	

21 CRIMSON.

9 lbs.	Glaze No. 6	Grind for use.
1 lb.	White Lead	
1 ,,	Base below	

Base—

19 lbs.	Flint	Mix well, and calcine in covered pots upon hardest part of Granite or China Biscuit.
21 ,,	Whiting	
6 ,,	Plaster Paris	
4 ,,	Fluor-Spar	
40 ,,	Oxide Tin	
1 lb.	Bichromate Potash	

22 ROYAL BLUE.

60 lbs.	White Lead	Grind for use; if this is too strong, add a little No. 1 Glaze.
30 ,,	Stone	
10 ,,	Flint	
6 ,,	Prepared Oxide Cobalt	

23 CHOCOLATE.

40 lbs.	Flint Glass	Calcine in Glost Oven.
$4\frac{1}{2}$,,	Black Oxide Manganese	
15 ,,	of this Base	Grind for use. Fire the Tiles
3 ,,	Glaze, No. 6	

dipped in this Glaze in easiest part of Glost Oven, or the tint will not be so rich.

24 IVORY ON WHITE.

9 lbs. Glaze, No. 6 . . .		Grind for use.
1 lb. White Lead . .		
1 oz. Fawn Base, No. 15		

25 ORANGE GLAZE.

33 lbs. White Lead . . .	
4½ ,, Flint	
1½ ,, Crocus Martis . . .	

26 PEA GREEN GLAZE.

8 lbs. White Lead . . .	
1 lb. Flint	
½ ,, Black Oxide Copper . .	

27 MAZARINE GLAZE (LAKIN'S).

50 lbs. Flint	Fritt and grind.
30 ,, Borax	
22 ,, White Lead . . .	
10 ,, Stone	
6 ,, Carbonate Soda . .	
6 ,, Oxide Tin . . .	
3 ,, Blue Calx . . .	

28 RAW BLACK GLAZE.

100 lbs. White Lead . . .	Grind for use.
18 ,, Flint	
40 ,, Manganese .	

29 SLATE GLAZE.

2 lbs. White Glaze . . .	Grind for use.
2 ozs. Oxide Nickel . . .	

30 DRAB GLAZE.

60 lbs.	Red Lead	Grind for use.
10 ,,	Raddle	
$2\frac{1}{2}$,,	Flint	
5 ozs.	Blue Calx	

MAJOLICA COLOURS.

For the sake of cheapness and simplicity these colours are frequently used in the raw state, but it is far better if they can be first fritted. Not only is the tint of colour arrived at with more certainty, but the effect upon the health of the workers is less prejudicial.

1 MAJOLICA SOFT GLAZE.

140 lbs.	Red Lead	Fritt in Glost Oven.
65 ,,	Lynn Sand	
50 ,,	Stone	
25 ,,	Borax	
10 ,,	Whiting	
5 ,,	Nitre	

2 BROWN.

33 lbs.	White Lead
$4\frac{1}{2}$,,	Flint
5 ,,	Crocus Martis

3 WHITE.

16 lbs.	Oxide Tin	Calcine in Glost Oven.
12 ,,	Common Glaze	
8 ,,	Stone	
8 ,,	Borax	
4 ,,	White Lead	
1 lb.	Carbonate Soda	

4 TURQUOISE.

Fritt, No. 1—

50 lbs.	Lynn Sand	Calcine in Glost Oven.
6 „	Carbonate Soda	
4 „	Oxide Copper	
$2\frac{1}{2}$ „	Nitre	
$2\frac{1}{2}$ „	Bay Salt	

Fritt, No. 2—

50 lbs.	Fritt, No. 1	Calcine in Glost Oven.
30 „	Oxide Tin	
20 „	Red Lead	
15 „	Enamel Flux, No 4	
15 „	Ground Glass	

Mixture—

18 lbs.	Fritt, No. 2	Grind for use.
8 „	Enamel Flux, No. 4	

5 DARK GREEN.

18 lbs.	Red Lead
10 „	Flint
5 „	Borate Lime
5 „	Felspar
$2\frac{3}{4}$ „	Oxide Copper

CHAPTER III.

GOLD.

In the preparation and use of gold, success almost entirely hinges upon details of manipulation. The proportion of mercury used to alloy the gold of course influences the thickness of the gilding after firing: but the proper grinding of the alloyed metals, upon which ease and economy in working depend, is only to be attained by allowing the mixture to become old. Brown gold should first be crushed to a fine powder in a mortar, and after adding the mercury the two should be laid by for at least a week, receiving a thorough rubbing every day. By this means the alloy will become perfectly black before being sent to the mill, the grinding will be greatly accelerated, and flaking in the pan will be almost entirely prevented.

GOLD.

1 LONGPORT BEST GOLD.

10 ozs. Brown Gold	. . .
7 „ Mercury	. . .
2 dwts. 12 grs. Bismuth	. .
10 „ Flux, No. 8	. .

2 LONGPORT CHASING GOLD.

18 dwts. Brown Gold . . .
15 „ Mercury . . .
1½ „ Silver . . . .
½ dwt. Prepared Bismuth . .
1 „ Flux, No. 8 . . .

3 LONGPORT COMMON GOLD.

16 dwts. Brown Gold . . .
12 „ Mercury . . .
4 „ Silver . . . .
½ dwt. Bismuth . . .
1 „ Flux, No. 8 . . .

4 LAKIN'S GOLD.

12 dwts. Green Gold . . .
7½ „ Quicksilver . . .
1½ „ Oxide Silver . . .
1½ „ Gold Flux . . .

5 LAKIN'S BRONZE GOLD.

2½ dwts. Ordinary Prepared Gold .
2 „ Oxide of Copper . .
1 dwt. Mercury . . .
¼ „ Gold Flux . . .

6 HULME'S GOLD.

12 dwts. Brown Gold . . .
8 „ Quicksilver . . .
2 „ Oxide Silver . . .
1 dwt. White Lead . . .

7 HULME'S BRONZE GOLD.

$2\frac{1}{2}$ dwts.	Burnish Gold	. . .
3 „	Oxide Copper	. . .
$1\frac{1}{4}$ „	Mercury	. . .
$\frac{1}{4}$ dwt.	Flux, No. 8	. . .

8 LIQUID GOLD FLUX.

4 ozs.	Canada Balsam	. .
2 „	Merbane Oil	. . .
40 drops	Oil of Lavender	. .

9 MEDIUM GOLD.

10 dwts.	Brown Gold	. . .
10 „	Mercury	. . .
5 „	Alloy	. . . .
45 grs.	Oxide Bismuth	. .
40 „	Prepared Silver	. .

10 REGULAR GOLD.

10 dwts.	Brown Gold	. .
10 „	Mercury	. . .
3 „	Silver	. . . .
5 „	Alloy	. . . .
28 grs.	Oxide Bismuth	. .

11 CHEAP GOLD.

10 dwts.	Brown Gold	. .
10 „	Mercury	
8 „	Alloy	. .
8 grs.	Silver	.
34 „	Flux, No. 8	. .

12 CHEAP GOLD.

10 dwts.	Brown Gold	. . .
10 „	Mercury	. . .
1 dwt.	12 grs. Silver	. . .
3 dwts.	Alloy	. . . .
12 grs.	Oxide Bismuth	. .
17 „	Flux, No. 8	. . .

13 REGULAR GOLD.

10 dwts.	Brown Gold	. . .
10 „	Mercury	. . .
1 dwt.	Alloy	. . . .
10 grs.	Silver	. . . .
12 „	Oxide Bismuth	. .
17 „	Flux, No. 8	. . .

14 HARD GOLD.

10 dwts.	Brown Gold	. . .
10 „	Mercury .	. . .
11 grs.	Flux, No. 8	. . .
6 „	Silver	. . . .
6 „	Alloy	. . . .

15 REGULAR GOLD.

10 dwts.	Brown Gold	. . .
10 „	Mercury	. . .
10 grs.	Prepared Silver	. .
10 „	Flux, No. 8	. .

16 RICH GOLD.

1 oz.	Brown Gold	. . .
$7\frac{1}{2}$ dwts.	Mercury	. . .
30 grs.	Flux, No. 8	. . .

GOLD OR NOBLE COLOURS.

TO PREPARE "PURPLE OF CASSIUS."

Acid Solution, No. 1—

3 parts Muriatic Acid (pure) .	
1 part Nitric Acid . . .	

Tin Solution, No. 2—

20 dwts.	Muriatic Acid (pure) .	
10 ,,	Nitric Acid . . .	
20 ,,	Distilled Water . .	

In 10 dwts. of acid solution, No. 1, contained in a glass or porcelain vessel, dissolve 1 dwt. brown gold.

In 50 dwts. of solution, No. 2, contained in a glass vessel, dissolve 10 dwts. well-granulated tin, which must be added by small pieces, each being allowed to dissolve before the addition of more. When the solution is complete it will assume the clear bright colour of brandy. The utmost care must be taken in this process. In a glass or porcelain vessel of sufficient size pour two quarts of pure distilled water, into which empty the gold solution, when it will become a pale straw colour, then add the tin solution very carefully. Stir continuously with a glass rod until the base is well formed, and this will be of a brilliant crimson tint. Time must be allowed for subsidence. The water should be removed gradually with a syphon and filtered, and the washing effected by constant changes of distilled water until the base is entirely freed from acid. The base is then collected on filter paper and dried, and is ready to be fluxed.

ROSE COLOUR.

Add to the above base,

1 dwt.	Chloride of Silver .	
4 lbs.	Rose Flux	
1 lb.	Flux, No. 8 . . .	

and grind with care.

7

ROSE FLUX.

4 lbs.	Cornish Stone	Calcine in Glost Oven in an easy place.
8 „	Flint	
8 „	Red Lead	
12 „	Borax	
12 „	Flint Glass	
4 ozs.	Nitre	

MARONE.

In preparing the base for marone, 10 dwts. of gold solution, No. 1, must be added to 20 dwts. of tin solution, No. 2. After precipitation add,

16 grs. Chloride of Silver
16 ozs. Marone Flux
and grind with care.

RUBY.

The base is the same as that for marone, but the mixture is—

6 grs. Chloride of Silver
4 ozs. Ruby Flux

MARONE FLUX.

36 ozs.	Red Lead	Calcine easy in Glost Oven.
14 „	Flint Glass	
50 „	Boracic Acid	

RUBY FLUX.

12 ozs.	Red Lead	Calcine easy in Glost Oven.
33 „	Flint Glass	
55 „	Borax	

ENAMEL COLOURS.—BASES.

1 RED.

Calcine sulphate of iron on heelers in hardening-on kiln, and wash thoroughly in hot water, afterwards drying for use. The tint of this colour entirely depends upon the heat at which it is calcined.

2 GREEN.

11 lbs.	Alum	Calcine in Biscuit Oven.
35 ,,	Oxide Chrome	
10 ,,	Oxide Zinc	

3 BLACK.

1 lb.	Oxide Copper	Calcine and grind well.
1 ,,	Oxide Cobalt	
1 ,,	Calcined Umber	

4 BUFF.

4 lbs.	Tin Ash
1 lb.	Crude Antimony
1 ,,	Red Lead
1 ,,	Red Oxide Iron

5 GREEN.

8 lbs.	Calcined Alum	Calcine twice in Biscuit Oven.
1 lb.	Oxide Chrome	
2 lbs.	Black Oxide Cobalt	

6 BLUE.

9 lbs.	Flint	Calcine in Biscuit Oven.
13 ,,	Oxide Zinc	
3 ,,	Oxide Cobalt	
1 lb.	Phosphate Soda	

7 BLUE.

40 lbs. Prepared Alum . . .	Calcine in Biscuit Oven.
3 „ Oxide Cobalt . . .	
½ lb. Oxide Zinc . . .	

8 BLUE GREEN.

2 lbs. Oxide Chrome . . .	Calcine in hard place of Biscuit Oven.
1 lb. Zinc	
1 „ Carb. Cobalt . . .	

9 DEEP GREEN.

3 lbs. Oxide Chrome . . .	Grind in water, and calcine in Biscuit Oven.
1 lb. Carb. Cobalt . .	

10 TURQUOISE.

Dissolve three parts prepared oxide of cobalt and one part oxide of zinc in sulphuric acid, then mix the solution with forty parts of alum dissolved in water. Evaporate to dryness, pound and calcine in crucibles at a red heat. If the turquoise is required to be green in tint, add to the alum solution about a sixteenth part of moist chromate of mercury.

11 SÈVRES TURQUOISE.

Dissolve two parts carbonate zinc and six parts carbonate cobalt in hydrochloric acid. Mix this with ninety-two parts of ammonia alum dissolved in water, after which add carbonate of soda until neutralised. Wash thoroughly and dry. Pass through a 30s. sieve, and calcine at a cherry-red heat until the *blue* shade is developed. Care must be taken not to have the heat too high, or it will become violet.

12 **KING'S BLUE.**

29 lbs.	Carbonate Cobalt	Calcine in Glost Oven.
29 ,,	Lynn Sand	
42 ,,	Carb. Potash	

13 **YELLOW GREEN.**

25 lbs.	Flint	Calcine at Biscuit heat, and pass through 60s. sieve. Wash thoroughly.
17½ ,,	Paris White	
17 ,,	Bichromate Potash	
5½ ,,	Plaster	
8 ,,	Felspar	
7½ ,,	Red Lead	

14 **BLUE GREEN.**

12 lbs.	Prepared Alum	Calcine in hardest place in Biscuit Oven.
3 ,,	Oxide Chrome	
3 ,,	Oxide Cobalt	

15 **BLUE.**

48 lbs.	Prepared Alum	Calcine in hard place in Biscuit Oven.
12 ,,	Oxide Zinc	
8 ,,	Oxide Cobalt	

16 **DARK BLUE.**

48 lbs.	Oxide Zinc	Calcine in hard place in Biscuit Oven.
24 ,,	Prepared Alum	
24 ,,	Flint	
9½ ,,	Oxide Cobalt	

17 **BLUE.**

24 lbs.	Prepared Alum	Calcine hard in Biscuit Oven.
24 ,,	Oxide Zinc	
4½ ,,	Oxide Cobalt	

18 **TURQUOISE.**

1 lb. Calcined Sulphate Copper .	Calcine in Glost Oven.
2 lbs. Slaked Lime . . .	
2 ,, Lynn Sand . . .	
½ lb. Common Salt . . .	

19 **GREEN.**

10 lbs. Bichromate Potash . .	Calcine in Biscuit Oven, and wash well.
5 ,, Carbonate Cobalt . .	
25 ,, Prepared Alum . . .	

20 **VICTORIA BLUE.**

32 lbs. Oxide Zinc . . .	Calcine in Biscuit Oven.
16 ,, Flint	
8 ,, Boracic Acid . . .	
8 ,, Oxide Cobalt . . .	
2 ozs. Nitrate of Potash . .	

21 **YELLOW BASE.**

2 lbs. Crude Antimony . .	Calcine on dishes in easiest place of Glost Oven.
4½ ,, Red Lead	
1½ ,, Oxide Tin	

22 **VICTORIA BLUE.**

8 lbs. Flint	Calcine in Biscuit Oven.
4 ,, Calcined Borax . . .	
6 ,, Black Oxide Cobalt .	
16 ,, Oxide Zinc . . .	

23 **COMMON DARK GREEN.**

1½ lbs. Oxide Chrome . .	Calcine in hardest part of Biscuit Oven, pound fine, and again calcine.
1 lb. Oxide Zinc . .	
2½ lbs. Flint . . .	
1¼ ,, Borax . .	
7½ ,, Oxide Cobalt . .	

24

MATT BLUE.

32 lbs.	Oxide Zinc	Calcine in hardest part of Glost Oven.
16 ,,	Flint	
8 ,,	Borax	
6 ,,	Cobalt	

25

CORAL.

Dissolve $2\frac{1}{2}$ lbs. sugar of lead and 1 lb. bichromate potash separately in boiling water. Mix together, and allow to stand until a deposit is thrown down. The water must then be drained off, and the orange sediment put into plaster moulds to gradually dry.

26

MATT BLUE.

3 lbs.	Oxide Zinc	Calcine in Glost Oven.
1 lb.	Oxide Cobalt	

27

PEACOCK BLUE.

16 lbs.	Prepared Alum	Calcine in Biscuit Oven.
4 ,,	Oxide Cobalt	
2 ,,	Oxide Chrome	

28

PEACOCK BLUE.

19 lbs.	Base, No. 27	Calcine in Biscuit Oven.
2 ,,	Oxide Cobalt	

29

BROWN.

40 lbs.	Oxide Zinc	Calcine in Biscuit Oven.
6 ,,	Red Oxide Iron	
6 ,,	Oxide Chrome	
5 ,,	Litharge	
5 ,,	Boracic Acid	

30 FRENCH BROWN.

1 lb.	Chromate Iron	Calcine on shallow saggers at top of Glost Oven.
$1\frac{1}{4}$ lbs.	Oxide Zinc	
$\frac{1}{2}$ lb.	Red Lead	

31 BLUE.

40 lbs.	Prepared Alum	Calcine twice in Biscuit Oven, and wash well.
3 ,,	Oxide Cobalt	
$1\frac{1}{2}$,,	Oxide Zinc	

32 BLUE.

3 lbs.	Oxide Cobalt	Calcine in Biscuit Oven.
6 ,,	Oxide Zinc	
14 ,,	Red Lead	
8 ,,	Flint	

33 NAPOLEON GREEN.

10 lbs.	Prepared Alum	Calcine in hard part of Biscuit Oven.
35 ,,	Oxide Chrome	
10 ,,	Oxide Zinc	
20 ,,	Cobalt	

34 NAPOLEON GREEN.

40 lbs.	Calcined Alum	Calcine in Biscuit Oven.
40 ,,	Cobalt	
20 ,,	Oxide Chrome	

35 TURQUOISE.

6 lbs.	Oxide Zinc	Calcine at top of Glost Oven.
2 ,,	Oxide Copper	
6 ,,	Red Lead	
12 ,,	Felspar	
2 ,,	Carbonate Soda	
4 ,,	Flint	
3 ,,	Paris White	
3 ,,	Oxide Tin	

36 **BLUE.**

40 lbs. Alum	Calcine in Biscuit Oven.
3 „ Oxide Cobalt	
½ lb. Oxide Zinc	

37 **BLUE.**

32 lbs. Oxide Zinc	Calcine in Glost Oven.
6 „ Oxide Cobalt	
16 „ Boracic Acid	

38 **BLACK.**

2 lbs. Oxide Cobalt	Calcine at easy heat.
2 „ Oxide Manganese	
5 „ Nitrate Potash	

39 **GREEN.**

12 lbs. Calcined Alum	Calcine in Biscuit Oven.
12 „ Chromate Mercury	
10 „ Oxide Cobalt	
3 „ Whiting	

40 **BROWN.**

6 lbs. Copperas	Calcine in crucible until ebullition has ceased. Wash well.
4 „ Sulphate Zinc	
13 „ Nitre	

41 **BROWN.**

4 lbs. Copperas	Treat as 40.
4 „ Sulphate Zinc	
10 „ Nitre	

42 **BROWN.**

2 lbs. Copperas	Treat as 40.
2 „ Sulphate Magnesia	
6 „ Sulphate Zinc	
10 „ Nitre	

43

RED BROWN.

7 lbs.	Oxide Zinc	Calcine in Biscuit Oven.
$1\frac{1}{4}$,,	Litharge	
$1\frac{1}{4}$,,	Boracic Acid	
$1\frac{1}{2}$,,	Oxide Chrome	
$1\frac{1}{2}$,,	Red Oxide Iron	

44

TURQUOISE.

20 lbs.	Flint	Calcine in Glost Oven.
15 ,,	Calcined Soda	
3 ,,	Black Oxide Copper	

45

TURQUOISE.

25 lbs.	Flint	Calcine in Glost Oven.
19 ,,	Carbonate Soda	
3 ,,	Nitrate Potash	
3 ,,	Common Salt	
4 ,,	Oxide Copper	

46

TURQUOISE.

50 lbs.	Flint	Calcine in Glost Oven.
50 ,,	Carbonate Soda	
4 ,,	Oxide Copper	
3 ,,	Pearl Ash	
3 ,,	Common Salt	

47

BLACK.

1 oz.	Calcined Copper
2 ozs.	Calcined Umber
$2\frac{1}{2}$,,	Blue Calx
4 ,,	Green Base, No. 14

48 **BLACK.**

3 ozs. Oxide Manganese . .	
1 oz. Iron Scales . . .	
$\frac{1}{4}$ „ Calcined Copper . .	
4 ozs. Blue Calx . . .	

49 **ORANGE.**

1 lb. Crude Antimony . .	Calcine in Glost Oven.
1 „ White Lead . . .	
1 „ Red Oxide Iron . . .	

50 **ORANGE.**

13 lbs. White Lead . . .	Calcine in Glost Oven.
13 „ Antimony . . .	
3 „ Burnt Sienna . . .	
5 „ Red Oxide Iron . . .	

ENAMEL FLUXES.

In a great number of fluxes in use a large proportion of glass is employed, due, doubtless, to the fact that the original compounders of these mixtures believed that glass was the most perfect combination of fusible materials. The great drawback to the use of glass is that its actual composition is not known to the potter. If glass be considered indispensable, it is most important that it should be procured of standard quality, and always from the same glass manufacturer. The cullet found in the possession of marine store dealers and other collectors is most unreliable, and usually consists of a large proportion of foreign glass which greatly differs from that employed in the original recipes. Most of these fluxes are described as being run down in Glost Oven; but it is better to subject them to a fire of shorter duration in a special kiln, as the long fire is apt to impair the finer qualities of the flux.

1

8 ozs. Flint Glass	. . . .	Run down in Glost Oven.
2 ,, Red Lead	. . . .	
2 ,, Borax	. . . .	

2

2 ozs. Flint Glass	. . .	Run down in Glost Oven.
2 ,, Flint	. . . .	
6 drs. Borax	. . . .	

3

4 ozs. Red Lead	. . . .	Run down in Glost Oven.
$3\frac{1}{2}$,, Flint Glass	. . .	
$2\frac{1}{2}$,, Borax	. . . .	

4

5 ozs. Red Lead	. . .	Run down in Glost Oven.
12 ,, Flint Glass	. . .	
1 oz. Nitrate Potash	. . .	

5

1 oz. Nitre	. . . .	Run down in Glost Oven.
2 ozs. Flint Glass	. . .	
2 ,, Red Lead	. . . .	
1 oz. Flint	. . . .	

6

3 ozs. Lead	. . . .	Run down in Glost Oven.
1 oz. Flint	. . . .	

7

3 ozs. Flint Glass	. . .	Run down in Glost Oven.
1 oz. Borax	. . . .	
4 ozs. Flint	. . . .	

8

6 lbs. Red Lead	. . . .	Run down in easy part of Glost Oven.
4 ,, Borax	. . . .	
2 ,, Flint	. . . .	

9

6 ozs. Red Lead	. . . .	Run down in easy part of Glost Oven.
6 ,, Flint Glass	. . . .	
1 oz. Borax	. . . .	
1 ,, Flint	. . . .	

10

1 oz. Red Lead	. . . .	Run down in Glost Oven.
1 ,, Borax	. . . .	
1 ,, Litharge	. . . .	
1 ,, Flint Glass	. . . .	

11

2 lbs. Borax	. . . .	Run down in Glost Oven.
1 lb. Flint Glass	. . . .	

12

4 lbs. Flint Glass	. . . .	Run down in Glost Oven.
1½ ,, Nitre	. . . .	
1 lb. Borax	. . . .	

13

2 lbs. Flint	. . . .	Run down in Glost Oven.
3 ,, Red Lead	. . . .	
4 ,, Borax	. . . .	

14

4 lbs. Red Lead	. . . .	Run down in Glost Oven.
3 ,, Flint Glass	. . . .	
2 ,, Flint	. . . .	
1½ ,, Borax	. . . .	

15

4 lbs. Borax	Run down in Glost Oven.
2 ,, Flint	

16

2 lbs. Flint	Run down in Glost Oven.
1 lb. Borax	

17

12 lbs. Red Lead	Run down in Glost Oven.
5 ,, Borax	
4 ,, Flint Glass . . .	

18

$3\frac{1}{2}$ lbs. Flint	Run down in easy place Glost Oven.
2 ,, Lead	
$3\frac{1}{4}$,, Nitre	
6 ,, Borax	

19

5 lbs. Borax	Run down in Glost Oven.
7 ,, Flint Glass . . .	
8 ,, Red Lead	

20

8 lbs. Flint Glass . . .	Run down in Glost Oven.
3 ,, Red Lead	
3 ,, Flint	
$7\frac{1}{2}$,, Borax	

21

3 lbs. Red Lead	Run down in Glost Oven.
3 ,, Borax	
2 ,, Flint	

22

4 lbs.	Borax	Run down in Glost Oven.
3 „	Red Lead	
$1\frac{1}{2}$ „	Flint	

23

8 lbs.	Red Lead	Run down in Glost Oven.
3 „	Flint	
2 „	Flint Glass	
1 lb.	Borax	

24

6 lbs.	Red Lead	Run down in Glost Oven.
2 „	Flint	
$1\frac{1}{2}$ „	Borax	

25

10 lbs.	Flint Glass	Run down in Glost Oven.
20 „	Red Lead	
5 „	Flint	
5 „	Borax	

26

$10\frac{1}{2}$ lbs.	Flint Glass	Run down in Glost Oven.
8 „	Borax	
6 „	Flint	
16 „	Red Lead	

27

3 lbs.	Borax	Run down in Glost Oven.
4 „	Red Lead	
2 „	Flint	

28

4 lbs.	Borax	Run down in hard place Glost Oven.
2 „	Flint Glass	
1 lb.	China Stone	

29

13 lbs. Red Lead		Run down in Glost Oven.
$2\frac{1}{4}$,, Flint Glass . . .		
$4\frac{1}{2}$,, Boracic Acid . . .		

30

$16\frac{1}{2}$ lbs. Red Lead		Run down in Glost Oven.
$3\frac{3}{4}$,, Flint Glasss . . .		
3 ,, Borax		

ENAMEL COLOURS.

1 COPPER BLACK.

1 lb. Calcined Copper . .
$2\frac{1}{2}$ lbs. Flux, No. 8 . . .

2 COPPER BLACK.

1 lb. Calcined Copper . .
1 oz. ,, Copperas . .
1 lb. Flux, No. 8 . .
2 ozs. Flux, No. 3 . . .

3 BLUE BLACK.

1 lb. Blue Calx . . .
1 ,, Calcined Umber . . .
6 lbs. Flux, No. 8 . . .
2 ,, Green Base, No. 14 . .

4 SHINING BLACK.

1 oz. Blue Calx . . .
3 ozs. Calcined Umber . .
1 oz. Flux, No. 8 . . .

5 BLACK.

1 oz. Blue Calx . . . .
1 ,, Calcined Umber . .
3 ozs. Green Base, No. 14 . .
6 ,, Flux, No. 22 . . .

6 "WORCESTER" BLUE.

16 ozs. Flint Glass . . .
$1\frac{1}{2}$,, Blue Calx . . .
1 oz. Potash . . . .
1 ,, White Enamel . . .
3 ozs. Red Lead . . . .

7 "WORCESTER" BLUE.

16 ozs. Flint Glass . . .
$1\frac{1}{2}$,, Blue Calx . . .
1 oz. Borax . . . .
1 ,, White Enamel . . .
5 ozs. Red Lead . . .

8 RHEAD AND GOODFELLOW'S BLUE.

$7\frac{1}{2}$ lbs. Flint Glass . . .
$\frac{1}{2}$ lb. Potash . . . .
$1\frac{1}{2}$ lbs. Red Lead . . .
$\frac{1}{2}$ lb. Blue Calx . . .
$\frac{1}{2}$,, Saltpetre . . .
$\frac{1}{2}$,, White Enamel . .

9 RHEAD AND GOODFELLOW'S DARK BLUE.

8 lbs. Flint Glass . .
$1\frac{3}{4}$,, Red Lead . .
$\frac{3}{4}$ lb. Blue Calx . .
$\frac{3}{4}$,, White Enamel .
$\frac{1}{2}$,, Pearl Ash .

10 M. LEE'S ENAMEL BLUE.

16 ozs.	Flint Glass	. . .
½ oz.	China Stone	. . .
5 ozs.	Red Lead	. . .
1½ „	Blue Calx	. . .
1 oz.	Nitre	. . . .
1 „	Potash	. . . .

11 DARK BROWN.

1 lb.	Dark Copperas	. .
5 lbs.	Flux, No. 8.	. . .

12 DARK BROWN.

1 lb.	Calcined Umber	. .
½ „	Burnt Sienna	. . .
3½ lbs.	Flux, No. 7	. . .

13 LIGHT BROWN.

1 lb.	Calcined Copper	. .
6 lbs.	Flux, No. 10	. . .
2 „	Copperas	. . .
½ lb.	Ironstone	. . .

14 DARK BROWN.

1 lb.	Copperas	. . .
2 lbs.	Flux, No. 8	. . .
¾ lb.	Flux, No. 7	. . .

15 LIGHT BROWN.

1 lb.	Easy Calcined Umber	.
3½ lbs.	Flux, No. 1	. . .

16 DEVONSHIRE BROWN.

1 lb.	Calcined Copperas	. .
2 lbs.	Flux, No. 14	. . .
½ lb.	Flux, No. 8	. . .

17 DEVONSHIRE BROWN.

½ lb.	Crocus Martis	
1 ,,	Manganese	
¼ ,,	Calcined Copper	
3 lbs.	Antimony	
6 ,,	Flux, No. 7	

18 HAIR BROWN.

1 lb.	Oxide Manganese	
3 lbs.	Flux, No. 8	

19 HAIR BROWN.

4 ozs.	Oxide Manganese	
½ oz.	Blue Calx	
6 ozs.	Flux, No. 8	
1½ ,,	Flux, No. 2	

20 CHOCOLATE BROWN.

1 lb.	Chromate Iron	
¾ ,,	Chromate Lead	
2 lbs.	Burnt Sienna	
3 ,,	Oxide Zinc	
8 ,,	Flux, No. 7	

21 CHOCOLATE BROWN.

4 lbs.	Crocus Martis	
12 ,,	Flux, No. 8	

22 WHITE ENANEL.

10 lbs.	Arsenic	
13½ ,,	Red Lead	
18 ,,	Flint Glass	
6 ,,	Borax	
6 ,,	Nitre	

23 WHITE ENAMEL FOR JET.

17	lbs.	Arsenic	
20	,,	Red Lead	
16	,,	Flint Glass	
$7\frac{1}{2}$	,,	Borax	
$6\frac{3}{4}$	,,	Nitre	

24 ETCHING COLOUR FOR JET.

$1\frac{1}{4}$	lbs.	Borax	
1	lb.	Flint Glass	
$1\frac{1}{4}$	lbs.	Flint	
3	,,	Litharge	

25 ETCHING COLOUR FOR JET.

3	lbs.	Borax	Run down in Enamel Kiln
$2\frac{1}{4}$	,,	Flint	
3	,,	Flint Glass	
$3\frac{1}{4}$	,,	Lead	

26 FAWN FOR H. K.

4	lbs.	U. G. Devonshire Brown, No. 16	Grind for use.
10	,,	Flux, No. 8	

27 FAWN FOR REGULAR KILN.

6	lbs.	U. G. Devonshire Brown, No. 16	Grind for use.
12	,,	Flux, No. 8	

28 YELLOW GREEN.

2	lbs.	Green Base, No. 2	
$\frac{1}{2}$	lb.	Yellow Base, No. 21	
3	lbs.	Flux, No. 1	

29 YELLOW GREEN.

2 lbs. Green Base, No. 2

½ lb. Yellow Base, No. 21

2 lbs. Flux, No. 9

30 POMONA GREEN.

1 lb. Oxide Green Chrome

2½ lbs. Flux, No. 6

1 ,, Flux, No. 3

31 POMONA GREEN.

2 lbs. Oxide Green Chrome

3 ,, Flux, No. 6

2 ,, Flux, No. 1

32 PEA GREEN.

2 lbs. Green Base, No. 2

½ lb. Yellow Base, No. 21

3 lbs. Flux, No. 1

33 BLUE GREEN.

5 lbs. Oxide Chrome

5 ,, Oxide Cobalt

12 ,, Alum

36 ,, Flux, No. 29

Run down.

34 ORANGE RED.

1 oz. Coleothar

3 ozs. Flux, No. 8

35 ORANGE RED.

4½ lbs. Coleothar

3 ,, Flux, No. 7

1 lb. Flux, No. 8

36 ORANGE RED.

1 lb. Burnt Sienna

2½ lbs. Flux, No. 8

37 NASTURTIUM RED FOR GILDING ON.

2 lbs.	Bichromate Potash	. . .	Run down.
30 ,,	Red Lead	. . .	
10 ,,	Nitrate Lead	. . .	
5 ,,	Calcined Borax	. . .	
5 ,,	Flint	. . .	

38 RAISED COMPOSITION.

30 ozs.	Yellow Base, No. 21	. .
8 ,,	Flux, No. 8	. . .
6 ,,	Tin Ash	. . .
20 ,,	Orange, No. 36	. . .

39 VELLUM FOR MENUS.

21 ozs.	Red Lead	. . .	Calcine in Glost Oven.
4 ,,	Tin Ash	. . .	
6 ,,	Borax	. . .	
20 ,,	Flint	. . .	

40 TURQUOISE.

2 lbs.	Turquoise Base, No. 18	.	Calcine in Glost Oven.
$1\frac{1}{2}$,,	Borax	. . .	
$\frac{3}{4}$ lb.	Oxide Zinc	. . .	
$\frac{1}{2}$,,	Common Salt	. . .	

41 HARD KILN TURQUOISE.

2 ozs.	Borax	. . .	Well crushed and mixed.
2 ,,	China Stone	. . .	
1 oz.	Flint	. . .	

Then add—

$\frac{1}{4}$ oz.	Carbonate Zinc	. . .
$\frac{1}{2}$,,	Nitrate Copper	. . .
2 dwts.	Common Salt	. . .

Calcine the whole low down in Glost Oven, ventilating the saggers

42 HARD KILN WHITE ENAMEL.

2 ozs. Borax	. . . .	Calcine in Glost Oven.
2 „ China Stone	. .	
1 oz. Flint	. . . .	
½ „ Oxide Tin	. . .	

MIXED ENAMEL COLOURS.

In every manufactory there are in use a number of colours which are produced by the simple method of mixing together the products of different colour makers. Without a knowledge of the actual colours in use it is manifestly impossible to say how they may be combined, but it is hoped that the following mixtures may at least prove suggestive :—

1 DRAB.

2½ lbs. Enamel Blue . . .
1½ „ Chrome Green . . .
3¾ „ Fawn . . . .

2 DISTANCE.

3 lbs. Shining Black . . .
1½ „ Purple . . . .
1 lb. Orange . . . .

3 DISTANCE.

4 lbs. Shining Black . . .
1 lb. Orange . . . .
1 „ Rose Colour . . .
1 „ Purple . . . .

4 BUFF FOR EARTHENWARE GROUNDS.

1 lb. U.G. Orange . . .
2 lbs. Enamel Yellow . . .
6 „ Enamel Orange . . .

5 **LIGHT BUFF FOR EARTHENWARE.**

2 lbs. Enamel Orange . . .	
1 lb. Rose Colour . . .	

6 **SPRIG BROWN.**

2 lbs. Dark Brown . . .	
1 lb. Purple	

7 **CELADON.**

4 lbs. Enamel Blue . . .	
3 ,, Chrome Green . . .	
12 ,, Flux, No. 8 . . .	

8 **FAWN.**

3 lbs. U. G. Orange . . .	
2 ,, Enamel Red . . .	
4 ,, Flux, No. 8 . . .	

9 **LILAC.**

$5\frac{1}{2}$ lbs. Enamel Blue . . .	
$\frac{1}{2}$ lb. Rose Colour . . .	
$\frac{1}{2}$,, Purple	

10 **LILAC.**

7 lbs. Enamel Blue . . .	
$3\frac{1}{4}$,, Purple	
2 ,, Rose Colour . . .	

11 **OLIVE.**

2 lbs. Shining Black . . .	
1 lb. Enamel Yellow . . .	
$\frac{1}{2}$,, Enamel Blue . . .	

12 STONE COLOUR.

12 lbs.	Enamel Blue	. .
$4\frac{1}{4}$,,	Rose Colour	. . .
4 ,,	Dark Chrome Green	. .
2 ,,	U. G. Pink	. . .

13 SALMON.

2 lbs.	U. G. Orange	. . .
$5\frac{1}{2}$,,	Flux No. 8	. . .

ANTIQUE AND VELLUM ENAMEL COLOURS.

1 BROWN BRONZE.

4 ozs.	Oxide Manganese	. .
12 ,,	Flux, No. 8	. . .
1 oz.	Tin Ash	. . . .

2 NAVY BLUE.

16 ozs.	Flint	. . . .
8 ,,	Carbonate Potash	. .
12 ,,	Red Lead .	. . .
12 ,,	Flint Glass	. . .
6 ,,	Oxide Cobalt	. . .
2 ,,	Common Salt	. . .
4 ,,	Tin Ash	. . . .

3 WINDSOR RED.

5 lbs.	Bichromate Potash	. .
$2\frac{1}{2}$,,	Nitrate Lead	. . .
$7\frac{1}{2}$,,	Red Lead .	. . .
$1\frac{1}{4}$,,	Calcined Borax	. .
2 ,,	Tin Ash	. . .
1 lb.	Flint Glass	. .

4

BRONZE GREEN.

3 lbs. Calcined Nickel	. . .
1 lb. Iron Scale	. . .
2 lbs. Blue Calx	. . . .
3 ,, Borax	. . . .
2 ,, Flint	. . . .
1 lb. Red Lead	. . . .
1 ,, Tin Ash	. . . .

5

EMERALD GREEN.

10 ozs. Flint Glass	. . .
$6\frac{1}{2}$,, Borax	. . . .
6 ,, Flint	. . . .
18 ,, Red Lead	. . .
$6\frac{1}{2}$,, Unfluxed Yellow	. .
$6\frac{1}{2}$,, Calcined Copper	. .
$2\frac{1}{2}$,, Tin Ash	. . . .

6

MOSS GREEN.

10 ozs. Flint Glass	. . .
20 ,, Red Lead	. . . .
5 ,, Borax	. . . .
5 ,, Flint	. . . .
2 ,, Calcined Copper	. .
1 oz. Tin Ash	. . . .

7

STRAW.

18 ozs. Red Lead	. . .
16 ,, Flint	. . . .
6 ,, Borax	. . . .
3 ,, Tin Ash	. . . .
$2\frac{1}{2}$,, Enamel Yellow	. . .

8

STONE COLOUR.

3	lbs.	Enamel Blue	
3	,,	Landscape Brown	
$1\frac{1}{4}$	,,	U. G. Orange	
2	,,	Best Rose Colour	
2	,,	Best Chrome Green	
2	,,	U. G. Pink	

9

OATMEAL.

30	ozs.	Red Lead	
24	,,	Flint	
16	,,	Borax	
7	,,	Tin Ash	
3	,,	Stone Colour, No. 8	

10

POMPADOUR.

10	ozs.	Red Lead	
9	,,	Flint	
6	,,	Borax	
2	,,	Tin Ash	
$\frac{1}{2}$	oz.	Rose Colour	

11

CRUSHED STRAWBERRY.

9	ozs.	Red Lead	
10	,,	Flint	
5	,,	Borax	
$2\frac{1}{2}$	,,	Tin Ash	
3	,,	Orange, No. 34	
$\frac{1}{4}$	oz.	Ruby	

12 MULBERRY VELLUM.

18 ozs.	Red Lead	
16 ,,	Flint	
6 ,,	Borax	
5 ,,	Tin Ash	
3 ,,	Devonshire Brown, No. 17	

13 CRIMSON VELLUM.

10 ozs.	Red Lead	
8 ,,	Flint	
6 ,,	Borax	
3 ,,	Tin Ash	
2 ,,	Best Ruby	

14 OLD GOLD VELLUM.

18 ozs.	Red Lead	
18 ,,	Flint	
7 ,,	Borax	
3½ ,,	Tin Ash	
4 ,,	Enamel Orange	

15 TERRA COTTA.

6 ozs.	Prepared Copperas	
6 ,,	Borax	
2 ,,	Red Lead	
1 oz.	Flint	
2 ozs.	Tin Ash	

16 MYRTLE GREEN.

3 lbs.	Red Lead	
2 ,,	Flint	
¾ lb.	Borax	
½ ,,	Tin Ash	
8 ozs.	Calcined Copper	

UNDER-GLAZE COLOURS.

The majority of under-glaze colours are dependent upon the glaze itself for fluxing power, but in some cases it is desirable to soften the colour to some degree. Many so-called under-glaze fluxes are merely dilutents, no softer than the colour, but necessary in order to modify its strength.

FLUXES FOR UNDER-GLAZE COLOURS.

1 SOFT DRESDEN FLUX.

10	lbs.	Borax	Calcine in Biscuit Oven.
10	,,	Flint	

2 FLUX.

$37\frac{1}{2}$	lbs.	Red Lead	Run down in Glost Oven.
15	,,	Flint	
$4\frac{1}{2}$	,,	Borax	

3 FLUX.

9	lbs.	Flint	Calcine in Biscuit Oven.
9	,,	Stone	
4	,,	Whiting	
$3\frac{1}{2}$	,,	Borax	

4 FLOWING FLUX.

20	lbs.	Flint	Calcine in Glost Oven.
6	,,	Stone	
9	,,	Borax	
4	,,	Whiting	

5 DOVE FLUX.

10	lbs.	Tin Ash	Calcine in Biscuit Oven.
40	,,	Whiting	
20	,,	Flint	

6 AMOY FLUX.

8	lbs.	China Clay	Calcine in Biscuit Oven.
6	,,	Ball Clay	
5	,,	Whiting	
4	,,	Tin Oxide	

7 BROSELEY FLUX.

4	lbs.	Stone	Calcine in Biscuit Oven.
3	,,	Flint	
4	,,	Whiting	
3	,,	Borax	
2	,,	Nitre	

8 RATHBONE'S MATT BLUE FLUX.

13½	lbs.	Borax	Run down in Glost Oven.
12	,,	Red Lead	
11	,,	Flint Glass	

9 RAW FLUX FOR BLUE.

6	lbs.	Flint
6	,,	Whiting
1	lb.	White Lead

UNDER-GLAZE COLOURS.

1 BLUE FOR CHINA.

5	lbs.	Prepared Oxide Cobalt
10	,,	Flux, No. 2

2 EARTHENWARE COBALT.

12	lbs.	China Cobalt, No. 1
5	,,	Flux, No. 1

3 DRESDEN BLUE.

$2\frac{3}{4}$	lbs.	Bamboo Blue
1	lb.	Black
1	,,	Neutral, No. 5

4 BAMBOO BLUE.

4	lbs.	Black Oxide Cobalt
$2\frac{1}{2}$	,,	Ground Pitchers

5 NEUTRAL.

5	lbs.	Bamboo Blue, No. 4
3	,,	Black
$1\frac{1}{2}$	,,	Flint

6 PEACOCK BLUE.

3	lbs.	Prepared Oxide Cobalt
$\frac{3}{4}$	lb.	Black
7	lbs.	Flux, No. 9.

7 STRONG WILLOW BLUE.

11	lbs.	Black Oxide Cobalt
2	,,	Flint
2	,,	Flint Glass

8 TEA WARE BLUE.

8	lbs.	Black Oxide Cobalt
$4\frac{1}{2}$	,,	Flint
$2\frac{1}{2}$	,,	Flint Glass

9 BROSELEY BLUE.

5	lbs.	Black Oxide Cobalt
9	,,	Flint
5	,,	Flint Glass

10 PALE BROSELEY BLUE.

4	lbs.	Black Oxide Cobalt	. .
10	,,	Flint	. . . .
5	,,	Flint Glass	. . .

11 FLOWING BLUE.

$6\frac{1}{2}$	lbs.	Black Oxide Cobalt	. .
$3\frac{3}{4}$	,,	Flux, No. 6	. . .

12 FLOWING BLUE.

8	lbs.	Black Oxide Cobalt	. .
5	,,	Flux, No. 6	. . .

13 DARK BROSELEY BLUE.

$6\frac{1}{2}$	lbs.	Black Oxide Cobalt	. .
6	,,	Flux, No. 7.	. . .

14 PHEASANT BLUE.

$\frac{1}{2}$	lb.	Black Oxide Cobalt	. .
9	lbs.	Flux, No. 6	. . .

15 DARK BANDING BLUE.

2	lbs.	Prepared Oxide Cobalt	.
10	,,	Flux, No. 6	. . .

16 CROSS BLUE.

3	lbs.	Bamboo Blue, No. 17	.
3	,,	Amoy Blue, No. 18	. .

17 BAMBOO BLUE.

4	lbs.	Black Oxide Cobalt	. .
$2\frac{1}{4}$	,,	Ground Pitchers	. .

18 AMOY BLUE.

$3\frac{3}{4}$ lbs.	Black Oxide Cobalt	
6 ,,	Ground Pitchers	

19 DARK IRONSTONE BLUE.

$2\frac{3}{4}$ lbs.	Strong Cobalt	
1 lb.	Black	
1 ,,	Neutral	
1 ,,	Flux, No. 6	

20 COMMON PRINTING BLUE.

7 lbs.	Zaffre Blue	
5 ,,	Flint	
3 ,,	Flint Glass	

21 GADROON BLUE.

$2\frac{1}{2}$ lbs.	Oxide Cobalt	
4 ,,	Flint	
2 ,,	Flint Glass	
1 lb.	China Clay	

22 RATHBONE'S MATT BLUE.

1 lb.	Black Oxide Cobalt	Calcine in Biscuit Oven.
3 lbs.	Oxide Zinc	
Take of above base, 4 lbs.		Calcine in Glost Oven.
Flux, No. 8, $5\frac{1}{2}$ lbs.		

23 MATT BLUE.

$\frac{1}{2}$ lb.	Blue Calx	Calcine in hard Glost Oven, and wash well.
8 lbs.	Prepared Alum	
$1\frac{1}{2}$ lbs.	Oxide Zinc	
$\frac{3}{4}$ lb.	Flint Glass	

24 MATT BLUE (PALE).

$\frac{1}{4}$ lb.	Tea Ware Blue No. 8	.	Calcine in Biscuit Oven.
8 lbs.	Prepared Alum	.	
$1\frac{1}{4}$ lbs.	Oxide Zinc	.	
$\frac{3}{4}$ lb.	Flint	.	

25 MATT BLUE.

$1\frac{1}{2}$ lbs.	Fine Blue Calx	.	Calcine in Glost Oven.
3 ,,	Oxide Zinc	.	
1 lb.	Prepared Alum	.	
$5\frac{1}{2}$ lbs.	Flux, No. 8	.	

26 BROWN.

$5\frac{3}{4}$ lbs.	Chromate Iron	.	Calcine in Biscuit Oven.
2 ,,	Manganese	.	
1 lb.	Black Antimony	.	
1 ,,	Crocus Martis	.	
$\frac{1}{4}$,,	Red Lead	.	

27 BROWN.

1 lb.	Calcined Umber	.	Calcine in Biscuit Oven.
4 lbs.	Chromate Iron	.	
1 lb.	Manganese	.	
1 ,,	Crude Antimony	.	
$\frac{1}{4}$,,	Red Lead	.	

28 BROWN.

6 lbs.	Chromate Iron	.	Calcine in Biscuit Oven.
1 lb.	Calcined Umber	.	
2 lbs.	Manganese	.	
$\frac{1}{4}$ lb.	Red Lead.	.	

29 LESSORE'S BROWN.

For painting on Glaze to be fired in Glost Oven.

3 lbs.	Prepared Manganese	.	Grind for use.
$\frac{1}{2}$ lb.	Enamel Flux, No. 8	.	

30 **BROWN.**

$6\frac{1}{4}$	lbs.	Chromate Iron	Calcine in Biscuit Oven.
$\frac{1}{2}$	lb.	Crude Antimony	
1	,,	Manganese	
$\frac{1}{2}$	,,	Red Lead	

31 **BROWN.**

5	lbs.	Crude Antimony	Calcine in Biscuit Oven.
5	,,	Red Lead	
$2\frac{1}{4}$	,,	Manganese	
$1\frac{1}{4}$	,,	Blue Calx	

32 **PIEDMONT BLUE.**

6	ozs.	Blue Calx	Calcine in Glost Oven.
8	lbs.	Prepared Alum	
$1\frac{1}{4}$	ozs.	Oxide Zinc	
$\frac{3}{4}$	oz.	Flint Glass	

33 **PIEDMONT BLUE.**

7	ozs.	Blue Calx	Calcine in Glost Oven.
8	lbs.	Prepared Alum	
$1\frac{1}{4}$	,,	Oxide Zinc	
1	lb.	Flint Glass	

34 **BROWN.**

$1\frac{1}{2}$	lbs.	Calcined Nickel	Calcine in Biscuit Oven.
6	,,	Crude Antimony	
$3\frac{1}{2}$	,,	Manganese	
$1\frac{1}{2}$	,,	Blue Calx.	

35 **BROWN.**

8	lbs.	Crude Antimony	Calcine in Biscuit Oven.
8	,,	Lead	
8	,,	Manganese	
1	lb.	Blue Calx	

36 DARK BROWN.

6	lbs.	Chromate Iron	Calcine in Biscuit Oven.
1	lb.	Manganese	

37 RED BROWN.

31	lbs.	Manganese	Calcine in Glost Oven.
6	,,	Red Lead	
$3\frac{1}{2}$	,,	Ground Glass	
6	,,	Flint	
$3\frac{1}{2}$	,,	Borax	

38 DARK BROWN.

4	lbs.	Oxide Manganese	Calcine in Glost Oven.
$1\frac{1}{4}$	,,	Green Oxide Chrome	
4	,,	Stone	
1	lb.	Enamel Flux, No. 8	

39 CHOCOLATE BROWN.

1	lb.	Chromate Iron	Calcine in Glost Oven.
3	lbs.	Oxide Zinc	
$\frac{1}{4}$	lb.	Lead	
2	lbs.	Tierra di Sienna	

40 BLACK.

3	lbs.	Chromate Iron	Calcine in Biscuit Oven.
1	lb.	Iron Scales	
1	,,	Oxide Nickel	
1	,,	,, Manganese	
$1\frac{1}{2}$	lbs.	Blue Calx	

41 BLACK.

12	lbs.	Calcined Chromate Iron	Calcine in Biscuit Oven.
1	lb.	Cobalt Blue	
3	lbs.	Flint Glass	
4	,,	Flint	

42 **BLACK.**

2 lbs.	Nickel	Calcine in Biscuit Oven, and then wash well.
2 ,,	Blue Calx	
4 ,,	Ironstone	
$1\frac{1}{4}$,,	Chromate Potash	
2 ,,	Manganese	

43 **BLACK.**

2 lbs.	Chromate Iron	Calcine in Biscuit Oven.
1 lb.	Nickel	
1 ,,	Manganese	
$\frac{1}{4}$,,	Blue Calx	

44 **BLACK.**

$\frac{3}{4}$ lb.	Manganese	Calcine in Biscuit Oven.
$1\frac{1}{4}$ lbs.	Crude Antimony	
3 ,,	Red Lead	
3 ,,	Blue Calx	
$\frac{1}{4}$,,	Oxide Tin	

45 **LONGPORT BLUE GREEN.**

12 lbs.	French Chrome
32 ,,	Oxide Zinc
8 ,,	Prepared Oxide Cobalt
5 ,,	Carbonate Potash
5 ,,	Flint
38 ,,	Flux, No. 1

46 **OLIVE GREEN.**

3 lbs.	Calcined Nickel
1 lb.	Iron Scales
2 lbs.	Best Cobalt Blue
10 ,,	Flux, No. 1

47 OLIVE GREEN.

2 lbs.	Blue Calx	Calcine in Glost Oven.
$1\frac{1}{2}$,,	Oxide Nickel	
1 lb.	White Lead	

48 GORDON GREEN.

4 lbs.	Oxide Chrome	Calcine in Glost Oven.
$3\frac{1}{2}$,,	Oxide Zinc	
6 ,,	Flint	
1 lb.	Flux, No. 1	

49 VICTORIA GREEN.

2 lbs.	Chromate Lead	Calcine in Biscuit Oven, and wash well.
$3\frac{1}{2}$,,	Flint	
$3\frac{1}{2}$,,	Whiting	
3 ,,	Bichromate Potash	

50 VICTORIA GREEN.

10 lbs.	Chromate Lead	Calcine in Biscuit Oven, and wash well.
30 ,,	Flint	
30 ,,	Whiting	
5 ,,	Sugar of Lead	

51 LILAC.

$3\frac{1}{2}$ lbs.	Oxide Zinc	Calcine in Biscuit Oven, and wash well.
3 ,,	Oxide Tin	
2 ,,	Chromate Lead	
$1\frac{1}{4}$,,	Alum	
$\frac{3}{4}$ lb.	Black Oxide Cobalt	

52 MULBERRY.

54 lbs.	Oxide Manganese	Calcine in Glost Oven.
14 ,,	Nitre	
6 ,,	Borax	
6 ,,	Flint	
6 ,,	Flint Glass	

53

MULBERRY.

4 lbs.	Blue Calx	Calcine in Glost Oven.
8 ,,	Oxide Manganese	
2 ,,	Nitre	
2 ,,	Borax	

54

MULBERRY.

1 lb.	Black Oxide Cobalt	Calcine twice in Biscuit Oven.
4 lbs.	Oxide Manganese	
1 lb.	Ground Pitchers	

55

MULBERRY.

8 lbs.	Oxide Manganese	Calcine in Biscuit Oven.
8 ,,	Oxide Tin	
2 ,,	Oxide Cobalt	
2½ ,,	Flint	
2 ,,	Chromate Iron	

56

ORANGE.

6 lbs.	White Lead	Calcine in Biscuit Oven.
12 ,,	Glass of Antimony	
12 ,,	Crocus Martis	
36 ,,	Crude Antimony	

57

COMMON ORANGE.

6 lbs.	Red Lead	Calcine in Biscuit Oven.
2½ ,,	Crocus Martis	
8½ ,,	Antimony	
1 lb.	Oxide Tin	
3 lbs.	Alum	

58

YELLOW.

4 lbs.	Lead and Tin Ash	Calcine in Biscuit Oven.
1 lb.	Crude Antimony	
2¼ lbs.	White Lead	
1 lb.	Flint	

59

YELLOW.

4 lbs.	Lead and Tin Ash	Calcine in Biscuit Oven.
1 lb.	Litharge	
1 „	Crude Antimony	
1 „	Flint	
1 „	Flint Glass	

60

YELLOW.

4 lbs.	Tin Ash	Calcine in Biscuit Oven.
2 „	Crude Antimony	
2 „	Red Lead	

61

PINK.

20 lbs.	Chromate Lead	Calcine in Biscuit Oven, and wash repeatedly.
40 „	Tin Ash	
20 „	Whiting	
10 „	Lynn Sand	
20 „	Borax	

62

PINK.

18 lbs.	Oxide Tin	Calcine in Biscuit Oven, and wash well.
9 „	Whiting	
1 lb.	Yellow Chrome	

63

PINK.

10 lbs.	Chromate Lead	Calcine in Biscuit Oven, and wash well.
160 „	Tin Ash	
80 „	Whiting	

64

PINK.

24 lbs.	Tin Ash	Calcine in hard place of Biscuit Oven, and wash well.
4 „	Ground Bone	
$1\frac{1}{2}$ „	Yellow Chrome	
8 „	Whiting	

65 BEST PERSIAN PINK.

$2\frac{1}{4}$	lbs.	Oxide Tin	Calcine in Biscuit Oven, and wash well.
1	lb.	Whiting	
$\frac{1}{2}$	oz.	Green Oxide Chrome	
6	lbs.	China Stone	

66 MARINE GREEN.

$1\frac{1}{4}$	lbs.	Oxide Chrome	Calcine in Biscuit Oven.
$5\frac{1}{2}$	ozs.	Oxide Cobalt	
6	,,	Oxide Zinc	
9	,,	Whiting	

67 BRONZE GREEN.

1	lb.	Oxide Chrome	Calcine in Biscuit Oven.
$2\frac{1}{4}$	lbs.	Flint	
$1\frac{1}{4}$	,,	Soda Crystals	

68 VIOLET.

50	ozs.	Pink, No. 61	Calcine in Biscuit Oven.
2	,,	Flint	
$4\frac{3}{4}$	,,	Oxide Cobalt	
3	,,	Carbonate Barytes	
$\frac{1}{4}$	oz.	Oxide Zinc	

69 RUSSET BROWN.

28	lbs.	Chromate Iron	Calcine in Biscuit Oven.
12	,,	Oxide Manganese	
12	,,	Iron Scales	
25	,,	Oxide Zinc	
6	,,	Litharge	

70 VIOLET BROWN.

$\frac{1}{2}$	lb.	Oxide Manganese	Calcine in Glost Oven.
4	lbs.	Carbonate Potash	
2	,,	Red Lead	
5	,,	Flint	

71 **BLACK.**

1	lb.	Bichromate Lead	Spread on plates, and calcine in Glost Oven.
1	,,	Oxide Manganese	
1	,,	Blue Calx	

72 **EDGING BLUE.**

1	lb.	Black Oxide Cobalt	Calcine in Biscuit Oven.
1	,,	Whiting	
1	,,	White Lead	
1	,,	Flint	

73 **LIGHT BROWN.**

2	lbs.	White Lead	Calcine in Glost Oven.
1	lb.	Antimony	
1	,,	Oxide Manganese	

74 **DARK BROWN.**

3	lbs.	White Lead	Calcine in Glost Oven.
6	,,	Antimony	
1	lb.	Oxide Manganese	
1	,,	Zaffre	

75 **DARK BROWN.**

3	lbs.	White Lead	Calcine in Glost Oven.
2	,,	Oxide Manganese	
1	lb.	Nitre	
1	,,	Blue Calx	

76 **BROWN.**

3	lbs.	Glass Antimony	Calcine in Biscuit Oven.
5	,,	White Lead	
2	,,	Oxide Manganese	
2	,,	Blue Calx	

77 VICTORIA GREEN.

3 lbs.	Whiting	Calcine in Glost Oven.
$4\frac{1}{2}$,,	Flint	
5 ,,	Chloride Lime	
6 ,,	Bichromate Potash	

78 YELLOW.

4 lbs.	Tin Ashes	Calcine on Biscuit dishes at bottom Glost Oven.
1 lb.	Red Lead	
1 ,,	Antimony	

79 YELLOW.

2 lbs.	Litharge	Treat as 78.
2 ,,	Antimony	
1 lb.	Tin Ash	

80 PINK.

40 lbs.	Oxide Tin	Calcine in Biscuit Oven, and wash well.
20 ,,	Whiting	
3 ,,	Flint Glass	
1 lb.	Oxide Chrome	

81 BROWN.

37 lbs.	Red Lead	Calcine in Glost Oven.
37 ,,	Crude Antimony	
18 ,,	Oxide Manganese	
8 ,,	Blue Calx	

82 BLACK.

20 lbs.	Red Lead	Calcine in Biscuit Oven.
25 ,,	Antimony	
15 ,,	Oxide Manganese	
40 ,,	Blue Calx	
5 ,,	Oxide Tin	

83 **MULBERRY.**

54 lbs.	Manganese	Calcine in Glost Oven.
26 „	Blue Calx	
14 „	Nitre	
18 „	Flint Glass	
10 „	Flint	
6 „	Borax	

84 **ORANGE.**

3 lbs.	Litharge	Spread on flinted dishes at top of Biscuit Oven.
2 „	Crude Antimony	
1 „	Crocus Martis	

85 **UNIQUE.**

43½ lbs.	Oxide Tin	Calcine in hardest part of Biscuit Oven, and wash well.
9 „	Boracic Acid	
6 ozs.	Bichromate Potash	
22 „	Black Oxide Cobalt	

86 **FLOWING BLUE.**

5 lbs.	Black Oxide Cobalt
5 „	Flux, No. 4

87 **CHINA OVEN BLUE.**

6 lbs.	Blue Cobalt	Calcine in Glost Oven.
4 „	China Pitchers	
10 ozs.	Red Lead	

88 **PRINTING BROWN.**

12 lbs.	Chromate Iron
6 „	Oxide Manganese

89 **NAPIER BLUE.**

2 lbs.	Blue Cobalt
5 „	Flint
5 „	Whiting

90 VICTORIA GREEN.

4 lbs. Bichromate Potash . .	Calcine twice in earthenware biscuit, ventilating the saggers. Wash well.
4 ,, Whiting	
4 ,, Flint	
2 ,, Fluate of Lime . . .	

MIXED UNDER-GLAZE COLOURS.

These colours may, for the most part, be simply ground and then used. Where calcination is needed instructions are so given.

1 STAMPING BLACK.

5 lbs. Black . . . .
½ lb. Bamboo Blue . . .

2 BUFF.

4 lbs. Orange . . . .
4½ ,, Yellow . . . .

3 DOVE.

3 lbs. Blue . . . .
2 ,, Pink . . . .
1 lb. Brown . . . .
8 lbs. China Stone . . .

4 FAWN.

1¼ lbs. Pink . . . .
½ lb. Orange . . .

5 FAWN.

6 lbs. Pink . . . .
2½ ,, Orange . . . .
½ lb. Yellow . . . .

6 CROSS GREEN.

3 lbs. Blue Green . . .
1 lb. Sage Green . . .
½ „ Teaware Blue . . .

7 BAMBOO GREEN.

2¾ lbs. Flowing Green . . .
½ lb. Black . . . .
½ „ Amoy Blue . . .

8 CROSSLET GREEN

4 lbs. Blue Green, No. 45 . .
1 lb. Ground Pitchers . .

9 GREEN.

1½ lbs. Victoria Green, No. 50 . } Calcine in Glost
1¾ „ Oxide Chrome . . . } Oven.

10 MARONE.

8 lbs. Pink . . . .
1 lb. Broseley Blue . . .
1 „ Amethyst . . .

11 MARONE.

18 lbs. Pink . . . .
1 lb. Blue . . . .

12 NEUTRAL.

5 lbs. Amoy Blue . . .
3 „ Black . . . .
1½ „ Flint . . . .

13 NEUTRAL.

6 lbs. Neutral, No. 12 . .
½ lb. Amoy Blue . . .
2 lbs. Flint . . . .

14

SLATE.

10 lbs. Black Oxide Cobalt	. .	Calcine in Biscuit Oven.
10 ,, Pink	. . . . .	
5 ,, Brown	. .	
40 ,, China Stone	. . .	

15

PURPLE BROWN.

30 lbs. Pink	. . . .
1 lb. Black	. . . .

16

DOVER GREEN.

8 lbs. Green, No. 66	. . .
$1\frac{1}{2}$,, Black	. . . .
5 ,, Pitchers	. . . .

17

DOVE.

2 lbs. Black Oxide Cobalt	. .
2 ,, Pink	. . . .
1 lb. Brown	. . . .
8 lbs. China Stone	. . .

18

UNIQUE.

10 lbs. Pink	. . . .	Calcine in Glost Oven.
1 lb. Oxide Cobalt	. . .	

19

AMETHYST.

5 lbs. U. G. Purple	. . .
$\frac{1}{4}$ lb. Prepared Oxide Cobalt	.

20

PURPLE.

8 lbs. Pink	. . . .
$1\frac{1}{2}$,, Napier Blue, No. 89	. .
$\frac{1}{2}$ lb. Oxide Cobalt	. . .

21 **LAVENDER.**

6 lbs.	Black	. . . .
4 „	Willow Blue	. . . .
2 „	Pink	. . . .

22 **CANTON.**

10 lbs.	U. G. Black	. . .
4 „	Prepared Oxide Cobalt	.

FLOW POWDERS.

1

5 ozs.	Red Lead	. . .
2 „	Common Salt	. . .
2 „	Lime	. . . .

2

3 lbs.	Paris White	. . .
3 „	Common Salt	. . .
2 „	Borax	. . . .

A flow powder gives the best result when it is used at the top of the sagger. To effect this, sufficient powder is placed in a biscuit tea-cup, which is supported on a prop, so that the top of the cup nearly reaches to the level of the rim of the sagger.

OILS AND VARNISHES.

BALSAM OF SULPHUR.

4 qts. Linseed Oil . .	Mix the Resin and Oil on a slow fire. When the Resin is melted,
4 ozs. Black Resin . .	
1 lb. Sulphur . . .	

and before the Oil boils, add the Sulphur. Boil the mixture very slowly until it "ropes" like Printer's Oil. If it will draw up two or three fine lines with the finger it is sufficient.

GROUNDING OIL.

4 qts. Linseed Oil . .	Boil for two hours.
3 ozs. Red Lead . . .	
2 ,, Gum Mastic . .	
1 qt. Turpentine . . .	

HARD GROUNDING OIL.

1 qt. Turpentine . .	Grind the Turpentine and Gum until fine, add the Oil and Resin, and boil for two hours.
4 ozs. Gum Mastic . .	
¼ pt. Linseed Oil . .	
½ oz. Resin . . .	

PRINTER'S OIL.

4 qts. Linseed Oil . .	Boil the first three together thoroughly, adding the Sulphur and Tar while the mixture is cooling.
1 qt. Rape Oil . . .	
2 ozs. Red Lead . . .	
3 ,, Sulphur . . .	
½ pt. Common Tar . .	

CHAPTER IV.

MEANS AND METHODS.

RECLAMATION OF WASTE GOLD.

It will always pay a potter to recover the gold from waste himself, rather than to sell it in its crude condition. The small ingots of gold that run to the bottom of the crucible are readily marketable, and the firing costs only a trifle.

All rags, waste, old pencils, and residue must be carefully collected, and the gilders' cups completely emptied. The mass of waste should then be put into glazed saggers, and set fire to in the open air. When burned to an ash the whole must be carefully collected, and, if necessary, pulverised. Any flux containing an abundance of oxidising substances will answer. If borax be used it should be roasted beforehand, or the great expansion may cause overflowing and loss of gold. Borax and nitre make a good flux, and there should be no stint of quantity. For melting purposes a crucible is better than a sagger, because the tapering form of the bottom gathers the gold into a single lump. The crucible should not be completely filled with flux, and it is a good plan to mix the waste powder with a small quantity of flux, and then to make a small pit in the centre of the flux in the crucible, and to fill up this pit with the gold. By this means the precious metal is kept from contact with the walls of the crucible, and is encouraged to fall direct to the bottom.

As to heat, the top of china glost is sufficient, but there is some risk in placing a crucible full of soft flux at the top of a bung, so that it is better to use the bottom of a Biscuit Oven, placing the crucible in a sagger half full of flint, in case of a breakage. If these operations be carefully performed, a small button of fine gold will be found at the bottom of each crucible.

THE USE OF COBALT.

An infallible method of detecting impure oxide. Dissolve either black oxide or prepared oxide, as the case may be, in pure muriatic acid diluted with distilled water, which very readily becomes saturated with cobalt, the solution yielding crystals of a red colour inclining to blue. On the other hand, if the solution becomes green in colour, it is owing to the presence of nickel or arsenic, either of which is inimical to the brilliancy of colour: and oxide so impure must be used with extreme caution.

Cobalt fluxes must be well mixed, the different ingredients very finely ground and perfectly dried, and they should be fired in the "forebung" of the Glost Oven in strong chambers. After being chipped they will require to be ground and well dried before being mixed with the cobalt oxides. In mixing the oxides with the fluxes it is a good plan to pass the mass through a sieve, so as to ensure that the particulars may more easily concrete when in a state of fusion. The mixture will require to be calcined in the Glost Oven, on no account above the "bag," in well-flinted earthenware crucibles or very strong chambers. After firing, the colour must be chipped free from all flint and pieces of pitcher. It is needful that the colours should be well washed twice, first with hot and then with cold filtered water after grinding at the mill, and lastly, well dried.

For painting on the glaze the colour should be used pre-

cisely as is the case with enamel colours, a thin coat to be applied in the first instance, and in the second a much thicker one. It is a safer plan to dry the pieces when decorated in either an enamel or hardening-on kiln. This is to a great extent a preventive of the colours running.

Matt blue is always a difficult colour to deal with. It is almost impossible to use it except in printing, and even then constant losses arise from the breaking up of the colour. This fault may be to a great extent obviated by hardening the colour, while unglazed, through the glaze kiln itself instead of through the hardening-on kiln. By this means the colour becomes firmly fixed to the ware, which afterwards only requires to be dipped in the usual way.

ENAMEL COLOURS.

In the making of enamel colours too much stress cannot possibly be laid on cleanliness and care. It is well to pass colour mixtures through a 30s. sieve after being well incorporated. Care must be taken that sieves and other utensils used in the mixing are, in all cases, most thoroughly cleansed.

The ingredients must be ground remarkably fine, and then so perfectly dried as to leave not the least humidity. This is particularly enjoined in the case of flint.

In the grinding of enamel colours at the mill the pans cannot be kept too clean, and should be well washed and brushed after each grinding, particularly about the spindle boxes of the mullers.

In the fritting of enamel colours in the Glost Oven, except when otherwise directed, it is not expedient to place them above the "bag." Nothing spoils the tint of colours more than their being scorched.

The different materials composing the fluxes should be finely ground or sieved, and most thoroughly incorporated before being fritted. After being passed through the fire

great care must be taken that none of the sagger or crucible adheres to the colour, otherwise mishap might ensue.

Attention must always be paid to the grinding and drying of fluxes. It is an essential feature that, before being mixed with the bases of colours, they should be perfectly dry.

CHROME RED.

Dichromate of lead, as it is called chemically, may be obtained by boiling oxide or carbonate of lead with an aqueous solution of monochromate of potassium, or by digesting the neutral chromate of lead in a dilute solution of caustic potash. The residuum should be well washed with distilled water. It is an insoluble scarlet-coloured powder.

CHROME YELLOW.

The simple chromate of lead is obtained in the following manner:—To a solution of a soluble salt of lead the addition is made of an equal part of chromate of potassium in solution, both being at boiling point. If the solutions are mixed in a cool state the precipitate will be pale yellow.

CHROMATE OF BARYTES

is prepared by dropping a solution of chromate of potassium into a solution of chloride of barium. The yellow precipitate must be well washed, and is as insoluble in water as the sulphate of barytes. Care should be exercised in touching these substances and solutions on account of their poisonous character.

DIOXIDE OF MANGANESE,

when found in its natural state, takes the name of pyrolusite. It is in this form that it becomes useful to the manufacturers of pottery. The chemical bye-product, precipitated black oxide of manganese, is also largely used.

SESQUIOXIDE OF MANGANESE

may be obtained by heating pure dioxide in a crucible to redness until the evolution of oxygen has ceased, or by exposing protonitrate of manganese to a red heat, the sesquioxide in either case remaining in the shape of a black powder.

THE PREPARATION OF LIQUID OR FRENCH BRIGHT GOLD.

Note.—The preparation of liquid gold requires the greatest possible care, not only on account of its valuable nature, but also, where caution is not exercised, the brightness of the metal may be seriously affected.

The acids, as well as the balsam and essential oils, require to be of the greatest possible purity, and the utensils should be Bohemian glass or hard porcelain.

The gold to be used must be roasted fine yellow gold.

GOLD SOLUTION.

The first operation is to prepare a strong solution, which may be done by dissolving two ounces of yellow gold in six ounces of muriatic acid and two ounces of nitric acid. The solution must be effected in a large testing glass of extra thickness. The gold requires to be added to the acids in small quantities at a time, otherwise excessive ebullition might take place. The solution may be noticed by the continual effervescence. When this ceases it may be taken for granted that the whole of the gold is dissolved. To ensure, however, that this is perfectly accomplished, it will be as well to let the test glass be in proximity to a very moderate heat. To the gold solution now add two dwts. of best granulated tin procurable. The latter will have the effect of again causing effervescence. When this ceases the mixture is accomplished.

THE MENSTRUUM.

The menstruum for liquid gold is composed of two parts of gurgun balsam and one part of oil of amber. These constituents must be incorporated with great nicety over a slow fire, and it is highly essential that this also should be done carefully.

LIQUID GOLD FOR USE.

When the menstruum is well mixed, the gold solution is then gradually added to the menstruum in small quantities at a time, being well stirred continually with a glass rod until the whole is thoroughly blended, which will probably take half an hour. The mixture may then be found too thick for use, and in this case the following flux may be added to the mass until a proper consistency is assumed, which can only be ascertained by close observation and experiment:—

LIQUID GOLD FLUX.

14 ozs. Gurgun Balsam.
8 „ Oil of Amber.
$\frac{1}{3}$ „ Essential Oil of Rosemary.

It may be observed that the longer liquid gold is allowed to stand after preparation the better it is, as its appearance is heightened by age.

CHAPTER V.

CLASSIFICATION AND ANALYSIS.

CLASSIFICATION OF CLAY WARE.

Class I.—Body uniformly fluxed, dense, cannot be scratched with the knife, fairly granular, translucent, very sonorous, white and uniform.

PORCELAIN.

Tender Porcelain.—Body easily fusible.

English.—Body consists of bone ash, china clay, and stone with felspar. Glaze contains borax and lead.

French.—The body consists of a vitreous mass with clay. The glaze is a leaden one of hard consistency.

Real Porcelain.—Body and glaze difficult of fusion.

Class II.—Body dense, cannot be scratched with the knife, sonorous, finely granular, not translucent.

STONEWARE.

Salt-glazed Stoneware.—Body of a reddish grey or bluish fracture. Generally glazed with a salt glaze.

Bristol Stoneware.—Light drab body, vitreous. Glazed with a stone and calcium glaze.

Ironstone Ware.—Body usually white and semi-vitrified. Artificially coloured, and has a composite glaze containing silica, calcium, borax, lead and alum.

Class III.—Body earthy, porous, pretty hard, opaque, texture open, little sonorous.

EARTHENWARE.

Fine Earthenware.—Body hard, white and sonorous. Glaze: a soft white one, containing both borax and lead.

Delft or Common Earthenware.—Body finely granular, more or less of a yellow tint, with a soft transparent glaze.

CLASS IV.—Body earthy, very porous, opaque, soft. Homogeneous texture, always coloured.

Commonest Pottery.—Usually seen partly glazed and partly unglazed. The glaze, consisting of salt and litharge, always easy of fusion and transparent.

Lustre Ware.—Body earthy, porous, opaque, and very soft. Texture not entirely uniform; with a metallic glaze, having no transparency.

CLASS V.—Body more or less not uniform, always coloured, very soft, porous and open, not sonorous and opaque.

Bricks, Tiles and Ornaments.—Sometimes glazed body, infusible except at a very high temperature.

Fire-proof Crucibles.—Body difficult of fusion. Not glazed.

LORD PLAYFAIR'S ANALYSIS OF PURE CLAYS.

CHINA CLAY.

Silica	45·56
Alumina with trace of Oxide of Iron .	40·76
Lime	2·17
Potassa with trace of Soda	1·90
Magnesia	traces
Phosphoric Acid	traces
Sulphuric Acid	faint traces
Water	9·61
	100·00

BLUE CLAY.

Silica	46·38
Alumina	38·04
Protoxide of Iron	1·64
Lime	1·20
Magnesia	traces
Water	13·44
	100·00

RED CLAY.

Silica	49·44
Alumina	34·26
Protoxide of Iron	7·74
Lime	1·48
Magnesia	5·14
Water	1·94
	100·00

THE MARKETS OF THE WORLD AND THE TRADE QUALITY OF THE IMPORTS OF ENGLISH CHINA AND EARTHENWARE.

CLASSIFICATION.

CLASS I. represents the countries which take the finest china and the best kind of earthenware.

CLASS II. represents those countries which take medium china and earthenware, both common printed and painted.

CLASS III. represents those countries only taking the commonest china and earthenware.

Class I.

British Possessions.	*Foreign Possessions.*
Canada (with the exception of the upper half of the North-Western Provinces).	Austria.
Indian Empire (Bengal).	Denmark.
,, (Madras).	France.
Victoria.	Germany.
Southern Australia.	Hungary.
Western Australia.	Italy.
New South Wales.	Russia.
Queensland.	U.S. America.

Class II.

British Possessions.	*Foreign Possessions.*
Australia, Southern.	U.S. America.
,, Western.	The Brazils.
Bermudas.	Belgium.
Cape Colony.	Bulgaria.
Cyprus.	Denmark.
Hong-Kong.	Holland.
Indian Empire (Punjab)	Japan.
,, (Madras).	Portugal.
Natal.	Montenegro.
New South Wales.	Norway.
New Zealand.	Roumania.
Tasmania.	Servia.
Queensland.	Spain.
	Sweden.
	Switzerland.
	Turkey.

CLASS III.

British Possessions.	*Foreign Possessions.*
Bermudas.	Argentina.
Borneo.	Bolivia.
Burmah.	Cambodia.
Ceylon.	Chili.
Guiana.	Cochin China.
Honduras.	Colombia.
Jamaica.	Congo States.
Labuan.	Costa Rica.
Mauritius.	Cuba.
Newfoundland.	Ecuador.
Straits Settlements.	Guatemala.
Tasmania.	Hayti.
	Persia.
	Peru.
	Mexico.
	San Salvador.
	Uruguay.
	Venezuela.

Cases may be known of all three classes of ceramic being sent to a country. It is, however, an unusual procedure.

APPROXIMATE TIME AND FUEL SCALE FOR OVEN FIRING.

	Number of Hours Fired.	Approximate Amount of Coal Consumed.
China Biscuit Oven	35 to 45	10 tons.
Earthenware Biscuit Oven	30 ,, 40	8 ,,
China Glost Oven	10 ,, 14	5 ,,
Earthenware Glost Oven	9 ,, 12	4 ,,
Regular Enamel Kilns	5 ,, 6	23 cwts.
Hard Kilns	6 ,, 7	27 ,,

ENAMEL KILN FIRING.

PYROMETRICAL TEST ON CHINA SLATES WITH THUMB TRIALS IN MAROON.

Estimated No. of Degrees Centigrade.	Estimated No. of Degrees Fahrenheit.	Gradation of Change of Tint.	Kiln Heat.
610	1130	Dirty Brown Tint	Regular Kiln.
650	1202	Brick Red	.. ..
690	1274	Brick Red passes to Rose, but Red retained on edges and thinner parts	.. ..
730	1346	Rose Colour passes to Purple . .	Hard Kiln.
770	1418	Rose Colour passes to Violet . .	.. ..
810	1490	Rose Colour passes to deep Violet .	.. ..
850	1562	Violet becomes lighter	.. ..
890	1634	Rose Colour entirely disappears. Violet becomes pale	.. ..

STANDARD WEIGHTS OF POTTERS' MATERIALS.

China Clay Slip	should	weigh	26	ounces	to a	pint.
Ball Clay	,,	,,	24	,,	,,	
Whiting	,,	,,	26	,,	,,	
Flint	,,	,,	32	,,	,,	
Stone	,,	,,	32	,,	,,	
Bone	,,	,,	30	,,	,,	
Spar	,,	,,	32	,,	,,	

DECORATED GOODS COUNT.

Article.	Numbers and Denominations.
Dinner Ware—	
Plates, 10 inches	Count as 12 to dozen.
,, 8 ,,	,, 15 ,,
,, 7 ,,	,, 18 ,,
,, 6 ,,	,, 18 ,,
,, 5 ,,	,, 24 ,,
Dishes, 9 ,,	,, 12 ,,
,, 10 ,,	,, 12 ,,
,, 12 ,,	,, 1½ pieces.
,, 14 ,,	,, 2 ,,
,, 16 ,,	,, 2 ,,
,, 18 ,,	,, 2½ ,,
Gravies, 16 ,,	,, 2½ ,,
,, 18 ,,	,, 3 ,,
,, 20 ,,	,, 3½ ,,
Soup Tureen Middles	,, 2 ,,
,, Covers	,, 2 ,,
,, Stands	,, 2 ,,
Sauce Tureen Middles	,, 1 ,,
,, Covers	,, 1 ,,
,, Stands	,, 1 ,,
Vegetable Dishes, 8 inches	,, 2½ to dozen.
,, 9 ,,	,, 3 ,,
,, 10 ,,	,, 3 ,,
Sauce Boats	,, 1½ ,,
Sauce Boat Stands	,, 1 piece.
Salads	,, 3 pieces.
Fruit and Ice Saucers	,, 24 ,,
Individual Pickles	,, 24 ,,
,, Butters	,, 36 ,,
Dessert Plates	,, 1 piece.
Low Comports	,, 1½ pieces.
Tall ,,	,, 3 ,,
Articles of Toilet Ware—	
Ewer	,, 1 piece.
Basin	,, 1 ,,
Chamber	,, 1 ,,
Soap	,, 1 ,,
Upright Tray	,, 1 ,,
Slop Jar	,, 5 pieces.
Chamber Cover	,, 1 or ¾ piece.
Brush Trays, 7 inches	,, 1½ pieces.
,, 8 ,,	,, 1¾ ,,
Teas	,, 1 Tea.
Breakfasts	,, 1¼ Teas.
Muffins, 6 inches	,, 1¼ ,,
,, 7 ,,	,, 1½ ,,
B. and B.'s	,, 2 ,,
Slops	,, 2 ,,
Sugars	,, 1½ ,,
Milks	,, 2 ,,
Creams	,, 2 ,,
Egg Cups	3 count as 2 ,,

CHAPTER VI.

COMPARATIVE LOSS OF WEIGHT OF CLAYS AND POTTERS' MATERIALS DURING DRYING AND FIRING.

Of each clay and material below named, 25 drams were taken in the commercial or damp state in which they were received, weighed with great care, and placed out on separate marked cards to air-dry by simple exposure on the top of the office desk for 20 hours, then finishing the drying by placing in front of the office fire for a short time, then weighing them again carefully, noting the weights, and subsequently firing each separately in marked cups in the Biscuit Oven. The above method is not by any means an exact one from a research point of view: but, as great care was bestowed on the experiments at each operation, the results are approximately correct and practically useful for several investigations a pottery manager may be called upon to make in connection with the trade at almost any time.

Dried Ground Flint (*i.e.* Calcined Selected Flints, Water Ground and Dried).—First sample, 25 drams taken, after drying weighed $24\frac{1}{4}$ drams, that is a loss of $\frac{3}{4}$ drams on 25, namely, 3 per cent. After firing this still weighed $24\frac{1}{4}$ drams.

Second sample, 25 drams taken, after drying weighed $24\frac{1}{8}$ drams, equals a loss of $3\frac{1}{2}$ per cent. This sample after firing only weighed 24 drams, giving a loss during firing of $\frac{100}{193}$ per cent., and a total of 4 per cent. loss in both drying and firing.

Dried Ground Stone (*i.e.* Cornish China stone, Water Ground and Kiln Dried).—First sample, 25 drams taken, dried, then weighed $23\frac{1}{2}$ drams, loss by drying 6 per cent. After firing this sample weighed 23 drams, therefore the loss by firing was $2\frac{6}{47}$ per cent., which, with the 6 per cent., makes a total loss of 8 per cent. on the 25.

Second sample, 25 drams taken, after drying weighed $24\frac{7}{16}$ drams, showing a loss by drying of $2\frac{1}{4}$ per cent. After firing in the oven this weighed 24 drams, *i.e.* a loss of $1\frac{349}{351}$ per cent. during firing alone, and a total loss on the 25 drams of 4 per cent.

China Clay, or Potters' China Clay.—First sample, 25 drams taken, after drying weighed $22\frac{5}{16}$, showing a loss of $10\frac{3}{4}$ per cent. This sample when fired weighed $19\frac{1}{2}$ drams, showing a loss in firing alone of $12\frac{216}{357}$ per cent., the total on the 25 drams being 22 per cent.

Second sample, 25 drams taken, when dried weighed 22 drams, loss by drying 12 per cent.: when fired weighed $19\frac{1}{16}$ drams, loss in firing $\frac{124}{352}$ per cent., total loss $23\frac{3}{4}$ per cent.

Ball Clay, or blue clay, such as is usually employed for white earthenware manufacture in Staffordshire.—First sample, 25 drams taken, when dried weighed $19\frac{5}{8}$ drams, the percentage loss by drying being thus $21\frac{1}{2}$. After firing this sample weighed $17\frac{5}{16}$ drams, therefore percentage loss by firing was $11\frac{246}{314}$, making a total loss of $30\frac{3}{4}$ per cent. for both drying and firing.

Second sample, 35 drams taken, after drying weighed $19\frac{1}{8}$ drams, giving a loss of $23\frac{1}{2}$ per cent. This sample when fired weighed 17 drams, which equals a percentage of $11\frac{17}{153}$ loss in firing, which gives a total of 32 per cent. loss.

Earthenware Body Clay when ready for use by the pressers.—One sample only tested; 25 drams taken, after drying as described; this weighed $19\frac{1}{8}$ drams, indicating a

percentage loss on drying of $23\frac{1}{2}$ per cent. When fired, the weight registered was $18\frac{1}{4}$ drams, showing a loss during firing alone of $4\frac{88}{153}$ per cent., and making a total loss of 27 per cent.

Tabulating the percentage results, we then have the following interesting comparison :—

Material.		Per Cent. Loss by Drying.	Per Cent. Loss by Firing.	Total Per Cent. Loss.
Flint	1st sample	3	0	3
,, ...	2nd ,,	$3\frac{1}{2}$	$\frac{100}{193}$	4
Stone	1st ,,	6	$2\frac{6}{47}$	8
,, ...	2nd ,,	$2\frac{1}{4}$	$1\frac{309}{391}$	4
China Clay	1st ,,	$10\frac{3}{4}$	$12\frac{216}{357}$	22
,, ...	2nd ,,	12	$13\frac{124}{352}$	$23\frac{3}{4}$
Ball Clay	1st ,,	$21\frac{1}{2}$	$11\frac{46}{314}$	$30\frac{1}{4}$
,, ...	2nd ,,	$23\frac{1}{2}$	$11\frac{17}{153}$	32
Body Clay	. . . .	$23\frac{1}{2}$	$4\frac{88}{153}$	27

The serviceable application of such results, when extended and confirmed, will be evident to practical potters. For instance, suppose it is required to calculate the quantity of body clay consumed in the manufacture of 100 dozens of any article of pottery, counting twelve to the dozen: take a few pieces in their dry biscuit state, freshly drawn from the oven, and weigh them: ascertain the average weight of one piece, multiply this weight by 1200, and then, presuming the 27 per cent., as per table, has been confirmed for the particular body of which the articles have been made, work out the sum by simple equations, thus—

$$\text{Product in lbs.} = x - \tfrac{27}{100}x.$$

x will then be the required weight of clay consumed in lbs.

Again, the results of such experiments may be useful in giving some indication of the degree of shrinkage to be expected in differently compounded bodies; and by thus

forecasting the shrinkage, an approximate allowance for or anticipation of this may be made, and the moulds corrected.

Further, these results show us better how to value the real costs of the several materials or clays of which a body is composed: for it is evident that if 100 lbs. of flint in a body clay means 97 lbs. in the biscuit warehouse, whereas 100 lbs. of ball clay means only about 59 or 60 lbs. of ware in the biscuit warehouse, the relative value of these two materials, as compared with their market price in a commercial condition, is very greatly modified.

For instance, 100 cwts. of dried ground flint in usual state costs, say, 2s. per cwt. = £10; it yields in biscuit ware 97 cwts.; therefore the cost per cwt. in the biscuit ware will be $200 \div 97 = 2{\cdot}062$s.

100 cwts. of ball clay in commercial state costs, say, 1s. 4d. per cwt. = £6, 13s. 4d.; it yields in biscuit ware, say, 60 cwts.; therefore the cost per cwt. in the biscuit ware will be $133\frac{1}{3} \div 60 = 2{\cdot}222$s.

Then, presuming our premises and inferences are quite correct, this shows that ball clay is actually 0·16s. per cwt. (say 2d. per cwt.) more expensive than flint in the biscuit warehouse. Other applications of these results will probably suggest themselves to practical potters as occasions arise.

CHAPTER VII.

SLOP GROUND FELSPAR CALCULATIONS AND EXPLANATORY PROOFS.

FOR the purposes of the Staffordshire earthenware trade, calcined flint or Cornish or Jersey stone, when finely ground in water, and in the condition technically known as Slop Flint or Slop Stone respectively (the finely ground particles being in suspension in water in a creamy consistency), is bought and sold by a certain definite standard; the customary standard of sale and purchase is that a peck of such slip flint or stone shall weigh 32 lbs., and in practice all pecks varying from this standard are reduced in account to an equivalent number of 32 lb. pecks. Taking this as a standard for slop ground felspar also, let us ask the question, What number of pecks of slop felspar of 32 lbs. weight each are equivalent in value to the number of pecks indicated by the under-mentioned weights on the weighbridge and by pint?—

(I.) $9\frac{1}{4}$ cwts. at $34\frac{1}{4}$ ozs. to pint.
(II.) 12 „ $34\frac{3}{4}$ „ „
(III.) 13 „ $35\frac{3}{4}$ „ „

To find the number of pecks by actual measure we reduce the number of cwts. to lbs., and then divide by the pint weight in ozs., because whatever the pint weight is in ozs. so is the peck in lbs. Thus—

$$\left.\begin{array}{ll}(\text{I.}) & (9\frac{1}{4}\times112)\div34\frac{1}{4}=30{\cdot}2481\\ (\text{II.}) & (12\times112)\div34\frac{3}{4}=38{\cdot}6762\\ (\text{III.}) & (13\times112)\div35\frac{3}{4}=40{\cdot}727\end{array}\right\}\text{ pecks by measure.}$$

Now the relative value of these pecks by measure is determined by the number the figures of the pint weigh in ozs. in excess of 20, for the reason that every increase of 1 oz. of pint weight over 20 ozs. is dependent upon a displacement of water by the material; and as this takes place in perfectly regular succession, integral and fractional, if the pint weight is 32 ozs., namely, 12 ozs. over the 20, the displacement has been just twelve times greater than if the pint weight were 21 ozs. So if the pint weighs 34, the displacement has been fourteen times greater, and so on; consequently we proceed to reckon the equivalent number of 32 lb. pecks thus—

$$\text{(I.)}\quad 12 : 14\tfrac{1}{4} :: 30{\cdot}2481 : 35{\cdot}916 :$$

for each of the ascertained numbers of pecks by measure is $34\frac{1}{4}$ lbs., and therefore of relatively greater value than the standard by $2\frac{1}{4}$ in 12. So with the others—

$$\text{(II.)}\quad 12 : 14\tfrac{3}{4} :: 38{\cdot}6762 : 47{\cdot}539.$$
$$\text{(III.)}\quad 12 : 15\tfrac{3}{4} :: 40{\cdot}727 : 53{\cdot}454.$$

The answer in each instance is the number of 32 lb. pecks to which the actual number of slop pecks of the given weight are in value equal to.

In this manner, whether the pint weights are over or under the standard, the value may be found.

And in practice the rule may be made shorter by cancelling. Thus—

$$\text{(I.)}\quad \frac{9\frac{1}{4} \times 112 \times 14\frac{1}{4}}{34\frac{1}{4} \times 12} = \frac{9\frac{1}{4} \times 9\frac{1}{3} \times 14\frac{1}{4}}{34\frac{1}{4}}$$

$$\text{(II.)}\quad \frac{12 \times 112 \times 14\frac{3}{4}}{34\frac{3}{4} \times 12} = \frac{12 \times 9\frac{1}{3} \times 14\frac{3}{4}}{34\frac{3}{4}}$$

$$\text{(III.)}\quad \frac{13 \times 112 \times 15\frac{3}{4}}{35\frac{3}{4} \times 12} = \frac{13 \times 9\frac{1}{3} \times 15\frac{3}{4}}{35\frac{3}{4}}$$

For those who are willing to follow this inquiry very closely step by step, the more detailed explanatory proofs following may be helpful :—

(*a*) The mean or average specific gravity of felspar may be taken as 2·6216, because orthoclase = 2·4 to 2·6, oligoclase 2·6 to 2·7, labradorite 2·67 to 2·76 : total, 15·73, which divided by 6 = 2·6216, the mean specific gravity.

(*b*) If from a pint of water a bulk of water weighing precisely 1 oz. is extracted, and this bulk exactly replaced by an equal bulk of felspar of the above-named specific gravity, the weight of the pint will have increased 1·6216 oz. But a bulk of felspar equal to 1 oz. of water weighs 2·6216 ozs., presuming our average specific gravity is correct : therefore, to increase the pint weight 1·6216 oz., 2·6216 ozs. of felspar are required : and by consequence, to increase the pint weight 1 oz., 1·6166748 oz. is required : for 1·6216 : 1 : : 2·6216 : 1·6166748.

(*c*) At 32 ozs. to pint the increase of weight per pint has been 12 ozs.: and as 1·6166748 oz. of felspar is required to increase the pint weight 1 oz., twelve times that weight is required to make the pint 32 ozs.: therefore a 32 oz. pint of slop felspar contains $12 \times 1·6166748$ oz. = 19·4009 ozs. of dry felspar: and so 1 peck of 32 lbs. contains 19·4009 lbs. dry weight of felspar.

(*d*) When the pint weight is 32 ozs. there are $3\frac{1}{2}$ pecks by measure in each cwt. of slop ($112 \div 32 = 3\frac{1}{2}$): and as each of these pecks contains 19·4009 lbs. dry felspar (see *c*), we infer that 1 cwt. of slop felspar will contain $3\frac{1}{2}$ times 19·4009 lbs. dry, namely, 67·9 lbs.

(*e*) At $34\frac{1}{4}$ ozs. to pint the increased weight in the pint is $14\frac{1}{4}$ ozs.: therefore the pint at $34\frac{1}{4}$ ozs. will contain $14\frac{1}{4} \times 1·6166748 = 23·0376$ ozs., and the peck of $34\frac{1}{4}$ lbs. slop will contain 20·0376 lbs. dry.

(*f*) When the peck is $34\frac{1}{4}$ lbs. there are $112 \div 34\frac{1}{4} = 3\frac{37}{137}$

pecks by measure in each cwt. of slop; therefore 1 cwt. of slop felspar at $34\frac{1}{4}$ ozs. to pint, and of the supposed specific gravity, contains $3\frac{37}{137} \times 23{\cdot}0376$ lbs. dry, namely, 75·33469 lbs. dry.

(g) Then, because $3\frac{1}{2}$ pecks at 32 ozs. to pint contain 67·9 lbs. dry weight, the 75·33469 lbs. found by f are equivalent to $3\frac{1}{2} \times 75{\cdot}3346 \div 67{\cdot}9 = 3{\cdot}88323$ pecks of 32 lbs. slop; therefore we calculate that $9\frac{1}{4}$ cwts. of slop felspar, at $34\frac{1}{4}$ ozs. to pint, are equivalent to 35·91987 pecks of slop felspar at 32 ozs. to pint.

Referring now to the earlier portion of this chapter, we see that by our simple rule we found the number to be 35·916, which, for all practical purposes, will be sufficiently near the absolutely correct.

(h) At $34\frac{3}{4}$ ozs. to pint the increase is $14\frac{3}{4}$: therefore, for the reasons already expressed, the dry contents equal $14\frac{3}{4} \times 1{\cdot}6166748 = 23{\cdot}84595$ ozs., and consequently the peck contains 23·84595 lbs. dry contents.

Again, at $34\frac{3}{4}$ lbs. to the slop peck there are $112 \div 34\frac{3}{4} = 3\frac{31}{139}$ pecks by measure in each cwt.: therefore 1 cwt. of slop felspar, at $34\frac{3}{4}$ ozs. to pint, we infer contains $3\frac{31}{139} \times 23{\cdot}84595$ lbs., namely, 76·856 lbs. dry felspar.

But it has been shown that 67·9 lbs. dry weight equal $3\frac{1}{2}$ pecks, at 32 ozs. to pint, *i.e.* $3\frac{1}{2}$ 32 lb. slop pecks: therefore 76·856 lbs. dry = 3·9614 32 lb. pecks.

So, because 1 cwt. of slop felspar at $34\frac{3}{4}$ ozs. to the pint equals 3·9614 pecks at 32 lbs., consequently 12 cwts. slop at $64\frac{3}{4}$ ozs. to pint = 47·5368 32 lb. slop pecks.

Referring again to the result by the simpler rule, we find it was 47·539, and this is almost identical with the result now obtained.

(i) At $35\frac{3}{4}$ ozs. to pint the increase over 20 is $15\frac{3}{4}$ ozs.: therefore dry contents = $15\frac{3}{4} \times 1{\cdot}6166748$, namely, 25·46262: therefore 1 peck contains 25·46262 lbs. dry.

When the slop peck weighs $35\frac{3}{4}$ lbs. there are $112 \div 35\frac{3}{4} = 3{\cdot}132867$ pecks by measure in 1 cwt. of slop: so we calculate each cwt. of slop felspar at $35\frac{3}{4}$ ozs. to pint contains $(3{\cdot}132867 \times 25{\cdot}46232) = 79{\cdot}77$ lbs. dry.

But it has been shown that, with felspar of the given specific gravity aforenamed, 67·9 lbs. dry are equivalent to $3\frac{1}{2}$ pecks of 32 lbs. each in the slop state. Therefore 79·77 lbs. dry = 4·1117 pecks of 32 lbs. each.

Therefore 1 cwt. of slop felspar at $35\frac{3}{4}$ ozs. to pint, although by measure it only contains 3·132867 pecks, still the equivalent in 32 lb. pecks of slop is 4·117 pecks, and for that reason 13 cwt. will be just 13 times 4·1117, namely, 53·4521 pecks of 32 lbs.

In conclusion, we give examples of the application of the rule in its most condensed form for the most rapid calculations :—

(I.) $(9\frac{1}{4} \times 9\frac{1}{3} \times 14\frac{1}{4}) \div 34\frac{1}{4} = 35{\cdot}199.$

(II.) $(12 \times 9\frac{1}{3} \times 14\frac{3}{4}) \div 34\frac{3}{4} = 47{\cdot}539.$

(III.) $(13 \times 9\frac{1}{3} \times 15\frac{3}{4}) \div 35\frac{3}{4} = 53{\cdot}455.$

CHAPTER VIII.

THE CONVERSION OF SLOP BODY RECIPES OR FORMULÆ INTO DRY WEIGHT PROPORTIONS, AND *VICE VERSA.*

Occasions arise in the course of long experience in manufacturing when changes of works or structural or mechanical alterations render it necessary, temporarily or permanently, to revert from a slop-weighing to a dry-weighing method. Circumstances may also cause interruption in the supplies of slop materials or variations in prices of the same that make the change desirable. From whatever cause this occurs, most manufacturers would like some assistance in checking their own calculations, lest by any means errors should creep in and lead to unfortunate losses, such as have at times occurred in this manner. From the fact that the specific gravities of the clays—flint, stone—are not very different from each other, and that it is usual to specify the pint weights respectively, as ball clay slip to be 24 ozs. to pint, china clay slip 26 ozs., slop flint 32 ozs., and slop stone 32 ozs., it becomes a comparatively simple reckoning. For at 24 ozs. to pint a pint of ball clay slip yields practically one-third of the dry weight of clay, as a pint of flint or stone at 32 ozs. to pint yields of dry material respectively; and china clay slip weighing 26 ozs. yields, as nearly as practicable, half the weight of dry material as slop flint or stone does at 32 ozs. to pint. Hence, if we wish to convert such a formula as the following to dry weight proportions:—

15 inches ball clay slip at 24 ozs. to pint.
9 „ china clay slip „ 26 „ „
6 „ slop flint „ 32 „ „
4 „ slop stone „ 32 „ „

we may do so accurately in a simple manner. Thus—

For the ball clay divide the 15 by 3, making 5; for the china clay divide the 9 by 2, making $4\frac{1}{2}$; and allow the figures for the flint and stone to remain unaltered. This gives us the proportions of positively dry materials.

5 parts by weight of dry ball clay.
$4\frac{1}{2}$ „ „ „ china clay.
6 „ „ „ flint.
4 „ „ „ stone.

Then ascertain the percentage of moisture in the clays and materials: presuming it to be—

18 per cent. in the ball clay,
$12\frac{1}{2}$ „ „ china clay,
3 „ „ flint,
4 „ „ stone,

we find the commercial weights by simple equations. Thus—

Ball clay, $5 = x - \frac{18}{100}x. \quad \therefore 5 = \frac{82}{100}x. \quad \therefore 500 = 82x.$

$\therefore x = \frac{500}{82} = 6\frac{1}{10}.$

China clay, $4\frac{1}{2} = x - \frac{12\frac{1}{2}}{100}x. \quad \therefore 4\frac{1}{2} = \frac{87\frac{1}{2}}{100}x. \quad \therefore 450 = 87\frac{1}{2}x.$

$\therefore x = \frac{450}{87\frac{1}{2}} = 5\frac{1}{7}.$

Flint, $6 = x - \frac{3}{100}x. \quad \therefore 6 = \frac{97}{100}x. \quad \therefore 600 = 97x$

$\therefore x = \frac{600}{97} = 6\frac{3}{16}.$

Stone, $4 = x - \frac{4}{100}x. \quad \therefore 4 = \frac{96}{100}x. \quad \therefore 400 = 96x$

$\therefore x = \frac{400}{96} = 4\frac{1}{6}.$

The equivalent proportions then will be—

$6\frac{1}{10}$	parts by weight of	ball clay	containing	18	p. c. moisture.
$5\frac{1}{7}$	,, ,,	china clay	,,	$12\frac{1}{2}$	,, ,,
$6\frac{3}{16}$	,, ,,	ground flint	,,	3	,, ,,
$4\frac{1}{6}$	,, ,,	ground stone	,,	4	,, ,,

For cases in which the pint weights of the formula to be converted are not in the usual order of 24 ozs., 26 ozs., 32 ozs., 32 ozs., our simple rule cannot immediately be applied. For instance, suppose it was required to convert the following slop formula to equivalent proportions in dry weights:—

15	inches	ball clay slip	at	24	ozs. to pint.
9	,,	china clay slip	,,	26	,, ,,
6	,,	slop flint	,,	31	,, ,,
4	,,	slop stone	,,	$30\frac{1}{2}$	,, ,,

we must first ascertain the equivalent measures of flint and stone at 32 ozs. To do so multiply the inches given by the specified pint weight in ounces less 20 (that is, $31 - 20 = 11$) and divide by 12; thus $(6 \times 11) \div 12 = 66 - 12 = 5\frac{1}{2}$.

Then for the stone $(4 \times 10\frac{1}{2}) \div 12 = 3\frac{1}{2}$. So we get the following:—

15	inches	ball clay slip	at	24	ozs. to pint.
9	,,	china clay slip	,,	26	,, ,,
$5\frac{1}{2}$	,,	slop flint	,,	32	,, ,,
$3\frac{1}{2}$	,,	slop stone	,,	32	,, ,,

Now we can apply the simple rule aforenamed, and so arrive at—

5	parts by weight of	dry	ball clay.
$4\frac{1}{2}$	,,	,,	china clay.
$5\frac{1}{2}$	,,	,,	flint.
$3\frac{1}{2}$	,,	,,	stone.

Then by making the calculations for moisture percentage in the clays and materials in the manner previously explained, *i.e.*, by means of simple equations, we find the commercial weight to be—

$6\frac{1}{10}$	parts by weight of	ball clay	containing	18	p. c. moisture.
$5\frac{1}{7}$	,,	china clay	,,	$12\frac{1}{2}$	,,
$5\frac{2}{3}$	,,	flint	,,	3	,,
$3\frac{2}{3}$	,,	stone	,,	4	,,

Again, suppose the formula to be converted was as under:—

15	inches	ball clay slip	at $23\frac{1}{2}$	ozs. to pint.
9	,,	china clay slip	,, 25	,,
6	,,	slop flint	,, 33	,,
4	,,	slop stone	,, 31	,,

Then to reduce the formula to standard pint weights the sums may be expressed thus—

Ball clay $[(15 \times 3\frac{1}{2}) \div 4] \div 3 = 4\frac{9}{24}$ dry.
China clay $[(9 \times 5) \div 6] \div 2 = 3\frac{3}{4}$,,
Flint $[(6 \times 13) \div 12] \div 1 = 6\frac{1}{2}$,,
Stone $[(4 \times 11) \div 12] \div 1 = 3\frac{2}{3}$,,

Then by means of simple equations, as indicated in previous instances, ascertain the equivalent weights of clays and materials in their usual commercial condition. Thus—

Ball clay $4\frac{9}{24} = x - \frac{18}{100}x$.
China clay $3\frac{3}{4} = \frac{12}{100}x - x$.
Flint $6\frac{1}{2} = x - \frac{3}{100}x$.
Stone $3\frac{2}{3} = x - \frac{4}{100}x$.

To convert recipes of dry weight proportions into recipes of slop measures of the customary weights to pint.

Suppose the formula to be—

200	lbs. ball clay	in commercial	state.
200	,, china clay	,,	,,
200	,, dry flint	,,	,,
150	,, dry stone	,,	,,

First of all, estimate the percentage of moisture in each clay and material, and deduct its per cent. Thus, say ball clay has been found to contain an average of 18 per cent. moisture, china clay $12\frac{1}{2}$ per cent., flint 3 per cent., and stone 4 per cent., then—

Ball clay	$= (200 - 36) = 164$	dry.
China clay	$= (200 - 25) = 175$	,,
Flint	$= (200 - 6) = 194$	,,
Stone	$= (150 - 6) = 144$	,,

Then we can proceed in either of two ways; thus, by applying our simple rule in the reverse manner, so—

$164 \times 3 = 492 = 49{\cdot}2 = 16\frac{1}{3}$	inches slop	24	ozs.
$175 \times 2 = 350 = 35{\cdot}0 = 11\frac{2}{3}$	,,	26	,,
$194 \times 1 = 194 = 19{\cdot}4 = 6\frac{1}{2}$	,,	32	,,
$144 \times 1 = 144 = 14{\cdot}4 = 5$	,,	32	,,

Or, taking ascertained average dry weights of contents of 1 peck of the various slips, we divide the dry proportions thereby, thus—

$164 \div 6\frac{7}{16} = 24\frac{1}{2} = 16\frac{1}{3}$	inches slop.
$174 \div 9\frac{9}{16} = 18\frac{1}{3} = 12\frac{1}{3}$	,,
$194 \div 19\frac{13}{16} = 9\frac{3}{4} = 6\frac{1}{2}$	,,
$144 \div 19\frac{1}{4} = 7\frac{1}{2} = 5$	,,

The two methods are thus shown to have only a trivial difference in results when compared as above.

Having thus obtained the slop formula, should the pint weights of the clay slips or slop materials, at any time obtainable, vary from the standards of 24, 26, 32, 32, respectively, mixing may still be proceeded with by the use of the "Special Ready Reckoner," or tables of equivalent measures of clay slips at different pint weights, compiled and published by Mr. W. J. Furnival.

In cases where it is intended to measure some of the clays or materials in a slop state, and to weigh the others in their commercially dry condition, whereas the body has hitherto been all measured slop:—

Ascertain the area of blending ark, then multiply by the depths of each material, and so obtain the pecks of each by measure. Then supposing the ball clay and china clay are to be weighed dry, and the flint and stone measured slop, as before, at 32 ozs. to pint, reduce the pecks to their dry contents by multiplying the number of pecks of ball clay slip by $6\frac{7}{16}$, and those of china clay slip by $9\frac{3}{16}$, then add the natural moisture percentage, and this gives the desired figures in lbs.

When it is required to find the dry recipe corresponding to a wet recipe, not only in relative proportions, but also in actually equivalent quantities or volume:—

Multiply the area measurements in inches of the blending ark by the several specified depths in inches of each slip, then divide the several numbers so obtained by 554·55, to find the respective number of pecks by measure. Then presuming the pint weights by the recipe are 24, 26, 32, 32, multiply the number of pecks of ball clay by $6\frac{7}{16}$ lbs., those of china clay by $9\frac{3}{16}$ lbs., those of flint by $19\frac{3}{4}$ lbs., and of stone by $19\frac{1}{4}$ lbs. Then, by simple equations, find the numbers equivalent in clays, etc., containing the usual percentage of moisture, and these will be the required weights.

CHAPTER IX.

A CALCULATION OF THE COSTS OF PREPARED WHITE EARTHENWARE GRANITE BODY CLAY, AND OF A GLAZE FOR THIS BODY.

FIRST of all, with regard to the body. Many circumstances conspire to render the cost of a prepared body clay more or less at one pottery than at another, such as the formula, the quality and value of the clays used, the costs of carriage thereon, the prices at which the flint and stone are purchased, the proportion of blue stain, the number of different bodies made, the economy in labour, wear and tear, waste, continuity or otherwise of working, the quantity of scraps remade, scarcely any two works being similar in all respects.

Consequently the resultant figures of these calculations will be of the character of examples, based mainly upon current methods and costs ruling in the Staffordshire potteries. By correcting the several items herein named to the actual costs at his own works, a manufacturer may arrive at a fairly correct estimate. The formula chosen is representative of a white earthenware body requiring a hard biscuit firing, such as is usually employed by manufacturers of what is technically known as granite ware, say to the point at which an average sample of Swedish felspar begins to melt.

The proportion of blue stain is rather less than for granite wear.

Formula of Body.

13	inches	depth of	ball clay slip	at	24	ozs.	to	pint.
12	,,	,,	china clay slip	,,	26	,,		,,
7	,,	,,	slop flint	,,	32	,,		,,
5	,,	,,	slop stone	,,	32	,,		,,

We will suppose the mixing or blending ark or tank to measure ten feet by five feet, and to have a depth of a few inches more than the total depth of the above-named blending, and say we use $3\frac{1}{3}$ pints of slop blue stain at 25 ozs. to pint: the stain being made of oxide of cobalt fluxed with half its own weight of china clay, calcined, and then ground in water and finely lawned. The costs of this will then work out thus: 2 lbs. of oxide of cobalt at 5s. 3d. per lb., 10s. 6d.; 1 lb. china clay, say 1d.; calcining and grinding, say 1s. 6d.: this gives a figure of about 4s. per lb. of dry stain. Now a pint of 25 ozs. to pint of such a stain is supposed to contain about $7\frac{1}{2}$ ozs. dry stain: $3\frac{1}{3}$ pints will then be $3\frac{1}{3} \times 7\frac{1}{2}$ ozs. = 23 ozs., say $1\frac{1}{2}$ lbs., at 4s. per lb.

It is taken for granted that the manufacturer has no clay mines or flint mills of his own, or, in the event of his having such, that they are worked independently: consequently, we estimate our costs at as nearly as possible average market prices now current in North Staffordshire.

The blending being done in a slip state, and the clays having been all previously intimately incorporated with water, so as to form semi-fluids or slips of the consistency of cream, it is necessary, for the purposes of the calculation, to discover what weight of dry clay or material is contained in a pint of the clay slip at the specified pint weight.

It must be observed, too, that there is a considerable difference in the pint weights of each of the four components,

one slip being 24 ozs. to pint, another 26 ozs., and the others 32 ozs. each; and this creates a great difference in the relative dry material contained in a pint of one slip as compared with another. Consequently, the actual proportion of material used in the body is not by any means apparent from a casual inspection of the simple depth in inches of each ingredient. The uninitiated may then ask what reason can be assigned for such a peculiar recipe. It is simply this: clays being in a state of minute subdivision, and also having an affinity for water, become thickened to a desirable degree with a less quantity of dry contents in the case of ball clay than in the case of china clay, and each of them much more so than in the case of flint and stone.

Lengthened experience has pointed out what weight to a pint each of the slips attains when in the most desirable or advantageous consistency for blending together with sufficient freedom, while at the same time not being thin enough to allow of a too ready subsiding or separation for the convenience of the operations of clay preparations.

There are two ways of ascertaining the dry contents of these several pints of slips: firstly, actual experiment: secondly, a calculation from the specific gravities of the materials.

Actual experiments were made thus: a pint of ball clay slip sieved through what are known as 14s. and 18s. mesh silk lawns, weighing $23\frac{3}{8}$ ozs. slop, yielded $5\frac{1}{4}$ ozs. of dry ball clay; this put again into a pint measure and filled up with water gave a slop pint weighing $23\frac{3}{16}$ ozs.

Another similar pint of ball slip clay weighing $23\frac{1}{8}$ ozs. slop yielded dry contents weighing $4\frac{3}{4}$ ozs.: this put into a pint measure and filled up with water gave a slop pint of $22\frac{7}{8}$ ozs. A pint of another sort of ball clay slip, sieved as above, weighing $23\frac{1}{16}$ ozs., yielded $4\frac{9}{16}$ ozs. dry clay, which when put into a pint measure and filled up with water gave

a slop pint of $22\frac{3}{4}$ ozs. Another pint of this ball clay slip, weighing 23 ozs., yielded $4\frac{15}{32}$ ozs., which, when put in a pint measure and filled up with water, weighed $22\frac{3}{4}$ ozs.

Another pint $21\frac{1}{2}$ ozs. slop gave $2\frac{5}{16}$ ozs. dry clay; this, when put into a pint measure and filled up with water, weighed $21\frac{7}{16}$ ozs. slop.

From the foregoing it is inferred that a 24 oz. pint contains $6\frac{7}{16}$ ozs. of dry ball clay.

Then as to china clay:—

A pint of china clay slip, sieved through 14s. and 18s. silk lawns, weighing 26 ozs. slop, was carefully dried, and yielded $9\frac{9}{16}$ ozs. dry china clay; this was put into a pint measure and filled up with water and weighed $25\frac{1}{16}$ ozs. Another pint of the same clay slip, weighing 23 ozs. slop, yielded $4\frac{3}{8}$ ozs. dry, which, when put into a pint measure and filled up with water, weighed $22\frac{9}{16}$ ozs. A pint of another sort of china clay slip similarly lawned, weighing 26 ozs., yielded $9\frac{1}{2}$ ozs. dry contents, and when put into a pint measure and filled up with water, weighed $25\frac{3}{8}$ ozs. Another pint of the same clay slip, weighing $24\frac{1}{8}$ ozs. slop, yielded $6\frac{1}{2}$ ozs. dry, which, when put into a pint measure and filled up with water, gave a slop pint weighing $23\frac{9}{16}$ ozs.

It seems reasonable, therefore, to infer that the average dry clay in a 26 oz. pint of china clay slip is, as nearly as practicable, $9\frac{9}{16}$ ozs.

To calculate dry contents from the specific gravity: Suppose the specific gravity to be 2·5, that is to say, we are supposing the clay or material when perfectly pure and dry to be bulk for bulk two and a half times heavier than water. Now, imagine a pint of water, namely, 20 ozs., having 1 oz. of water taken out, and a precisely similar bulk of the clay or material put in, the measure will still be exactly full, but will have increased in weight $1\frac{1}{2}$ ozs., and will now weigh $21\frac{1}{2}$ ozs. So we see that to increase the pint weight

$1\frac{1}{2}$ ozs. with the clay we have, we must add $2\frac{1}{2}$ ozs. of the dry clay.

Then to find dry contents of a 24 oz. slop pint of the known specific gravity 2·5, we use the proportional sum thus—

$$1\tfrac{1}{2} : 2\tfrac{1}{2} :: 4 : 6\tfrac{10}{15}.$$

In like manner, with a pint or slip weighing 26 ozs., and having a known specific gravity of 2·5—

$$1\tfrac{1}{2} : 2\tfrac{1}{2} :: 6 : 10,$$

and so on, according to specific gravity.

Proceeding with the calculation, by the formula we take of ball clay slip a depth of 13 inches with an area of mixing ark of 10 feet by 5 feet, *i.e.* 50 superficial feet, or 7200 square inches; then $7200 \times 13 = 93{,}600$ cubic inches of ball clay slip at 24 ozs. to a pint.

Reduced to pecks (*i.e.* $93{,}600 \div 554·55$), this is nearly 169 pecks. Now if we assume from foregoing experiments and theory that a 24 oz. pint of ball clay slip contains $6\frac{7}{16}$ ozs. dry clay, which is equal to $6\frac{7}{16}$ lbs. to the peck, we find that the 169 pecks of ball clay slip contain $(169 \times 6\frac{7}{16})$ 1087 lbs. dry.

Of china clay slip we take a depth of 12 inches, with the specified area of 10 feet by 5 feet, that is, 7200 square inches $\times 12 = 86{,}400$ cubic inches: then, $86{,}400 \div 554·55 =$ 156 pecks, 156 pecks $\times 9\frac{9}{16} = 1490$ lbs. dry china clay.

Of slop flint we have 7 inches deep: therefore $7'' \times 10' \times 5' = 7 \times 7200 = 50{,}400$ cubic inches, and this gives $50{,}400 \div 554·55 = 91$ pecks; and as one peck of 32 lbs. of slop flint is estimated to contain $19\frac{13}{16}$ lbs. dry flint, the 91 pecks slop will be equal to about 1803 lbs. of dry flint.

Of slop stone we have 5 inches deep: that will be $5'' \times 10' \times 5' = 5 \times 7200 = 36{,}000$ cubic inches $= 36{,}000 \div 554·55$ pecks = say 65 pecks.

Calculating the 32 lbs. slop peck of stone at $19\frac{1}{4}$ lbs. dry contents, this gives us $65 \times 19\frac{1}{4} = 1251$ lbs.

In this manner we arrive at the following results as the positively dry proportions of the formula:—

1087	lbs.	dry	ball clay.
1490	,,	,,	china clay.
1803	,,	,,	flint.
1251	,,	,,	stone.
$1\frac{1}{2}$	,,	,,	blue stain.

But ball clay and china are not commercially purchasable in a perfectly dry state, so we must further estimate what proportion of clay, etc., in the usual commercial state, is equivalent to the above figures.

Nothing short of actual experiment will aid us in these instances, and our experiments must be fairly averaged and considered to attain moderate accuracy, because so many little causes of variation exist in practice.

A wet lump of china clay was taken, which had been exposed to rain until quite damp, but not doughy or soft at all: this weighed 3 ozs. 10 drs. After drying slowly in an evaporating dish over a sand-bath heated by a Bunsen burner, the dry clay then weighed 43 drs., showing a loss of weight of 15 drs., which is equivalent to (58 : 15 : : 100 : 25·8), a sensible moisture of say $25\frac{3}{4}$ per cent.

Another small lump of china clay, which, having been protected by the superincumbent clay, was only normally dry, about as clay usually is: this weighed 1 oz. 4 drs., and after drying in the manner aforenamed, weighed, when powder dry, 18 drs., showing a loss of 2 drs. in 20, which is equivalent to 10 per cent. of sensible moisture. It seems reasonable, therefore, to reckon average china clay in its commercial state as containing $12\frac{1}{2}$ per cent. hygroscopic moisture.

With ball clay the following experiments were made :—A wet lump that had been exposed to the rain until quite damp, but not sodden, weighing 3 ozs. 8 drs., was dried over an evaporating basin on a sand-bath, powdered and dried again (perhaps a little too much, as it began to blacken at the bottom): when dried this weighed 44 drs., *i.e.* a loss of 12 drs. in 56 drs., or say $21\frac{1}{2}$ per cent. of moisture had been removed.

Another lump rather more than commercially dry was taken, weighing 26 drs. dried in evaporating basin over a bath, slowly and carefully. When dried this yielded $21\frac{1}{2}$ drs., giving a loss of $4\frac{1}{2}$ drs. in 26, or $17\frac{4}{13}$ per cent.

Therefore it seems fair to assume an average percentage of moisture in commercial ball clay of 18 or 19 per cent.; more or less also at different seasons, because it is customary to expose these clays to the weather. To say 18 per cent. will, at anyrate, be within the mark.

In calculating our ball clay costs, it will then be necessary to reckon such a weight as that when 18 per cent. is deducted the weight of 1087 lbs. will remain as the positively dry contents. This necessitates the employment of elementary algebra. Thus—

$$1087 = x - \frac{18}{100}x \therefore 1087 = \frac{82}{100}x \therefore 82x = 108{,}700$$

$$\therefore x = 1325{\cdot}6,$$

say 1326 lbs.

And the china clay in the same way will have to be calculated to such a figure as when $12\frac{1}{2}$ per cent. shall be deducted from it there will remain our dry weight of 1490 lbs. Therefore the sum may be expressed as follows:—

$$1490 = x - \frac{12\frac{1}{2}x}{100}$$

$$1490 = \frac{87\frac{1}{2}x}{100}$$

$$87\tfrac{1}{2}x = 149{,}000$$

$$\therefore x = 1702{\cdot}8,$$

say 1703 lbs. of commercial china clay.

There is, however, one other consideration that we must take account of, namely, the proportion of siftings or knockings. Now, if we allow, say 2 per cent. for the ball clay, and ½ per cent. for the china clay, under this head, we shall probably be nearly correct. Say then—

Ball clay, commercial state . .	1353 lbs.
China clay, commercial state . .	1712 lbs.

For the formula and capacity of ark supposed, we then estimate to require for one blending

1353 lbs. ball clay (in ordinary commercial condition).
1712 lbs. china clay (in ordinary commercial condition).
91 pecks slop flint at 32 ozs to pint.
65 pecks slop stone at 32 ozs. to pint.

As to quality and price of clays for such a body as the one indicated, the ball clay should largely consist of the best selected white ball clay, specially adapted for semi-porcelain, or some other very superior and white Devonshire ball clay. This necessarily adds a few shillings a ton to the first cost, but is compensated by the excellence of whiteness attained, with a minimum expenditure in blue stain. The cost of this white ball clay delivered in Staffordshire is about 30s. 6d. per ton net.

If two-thirds of such ball clay are used, together with one-third of the ordinary blue clays at about 5s. per ton

lower cost, this gives us, say, 29s. per ton as the cost price of our ball clay. Similar conditions apply to the china clay, for if superior results are to be attained, superior materials must be employed, say, for china clay, such qualities as I R and S, A1, J M, C D B, and similar kinds, associated perhaps with E D, V O B, and the like. If we fix the net cost price at an average of 34s. at the works, we shall, at anyrate, not be far above the actual cost of Staffordshire.

Then as to slop flint and stone. Assuming that these are bought as required, we shall escape a long series of calculations as to cost of breakdowns, lost time, boiler repairs, etc., and simply have to reckon the net price per slop peck of 32 lbs. Taking this at, say, 4d. for slop flint and 5d. for stone, less 10 per cent. discount, will be quite as low as we can fairly consider in our costs.

Summarising then, we have—

12 cwts. 0 qrs. 9 lbs. ball clay at 29s. per ton	£0	17	6
15 cwts. 1 qr. 4 lbs. china clay at 34s. per ton	1	6	0
91 pecks slop flint at 4d. (less 10 per cent.) .	1	7	4
65 pecks slop stone at 5d. (less 10 per cent.) .	1	4	5
$1\frac{1}{2}$ lbs. blue stain at 4s. per lb. . . .	0	6	0
Total for materials . . .	£5	1	3

The absolutely dry weights estimated to be required were 5632 lbs. Now if we consider pugged body clay when ready for use contains 23 per cent. of moisture, the yield will be theoretically $7314\frac{1}{4}$ lbs. Suppose we say 7250 lbs., or $64\frac{3}{4}$ cwts. This, at a cost of £5 1s. 3d., is equivalent to about 1s. $6\frac{3}{4}$d. per cwt., or £1 11s. 3d. per ton of pugged clay for clays, flint, stone, and stain.

The other items may be entered as follows:—

Labour: Clay-wheeling, slip-making, lawning, magneting, pumping, pressing, pugging, and tenting of engine and boiler . .	2s. 8d. per ton.
Estimated "up-keep," costs of press cloths and lawns	10d. ,,
Repairs to clay-making machinery, pumps, taps, and presses	1s. ,,
Oils, indiarubber, sundries	2d. ,,
Fuel and boiler repairs	8d. ,,
Gas, water rates, taxes, and insurance . .	6d. ,,
Rent, depreciation, and building repairs .	1s. 6d. ,,
Management expenses	3d. ,,
Loss and scraps	3d. ,,
	7s. 10d. per ton.

Add to this the 31s. 3d. per ton, and we have 39s. 1d. per ton as the cost of the pugged body clay by the formula we have supposed as used.

The Glaze.

For our recipe we will take the proportions as under:—

Fritt.—168 lbs. English refined borax.
84 ,, ground Cornish stone.
96 ,, ground calcined flints.
84 ,, whiting (calcium carbonate).
35 ,, best china clay.

The above fritted together in the customary manner in a fritt kiln, run off, cooled, and weighed into stock.

Glaze for the Mill.

250 lbs. fritt as above.
160 ,, ground Cornish stone.
70 ,, ground calcined flint.
130 ,, dry white lead.

Ground together intimately with water in a potter's glaze pan to a degree of fineness such as to be almost impalpable, then lawned and aged for say fourteen days or more.

Summary of Costs of Fritt.

$1\frac{1}{2}$ cwts. borax at 22s. 6d. per cwt. .	£1	13	9
$\frac{3}{4}$ cwt. stone at 2s. 6d. ,, .	0	1	11
$\frac{7}{8}$,, flint at 2s. ,, .	0	1	9
$\frac{3}{4}$,, whiting at 1s. 9d. ,, .	0	1	3
35 lbs. china clay at 2s. ,, .	0	0	8
	£1	19	4
Preparing the materials, weighing and fritting	0	3	0
Fuel, interest, repairs . . .	0	2	6
	£2	4	10

As to the yield, we estimate the 168 lbs. borax to give 90 lbs., the stone 80 lbs., flint 93 lbs., whiting 42 lbs., china clay 28 lbs., when fritted, or a total yield of fritt of say 333 lbs.; but there is a slight unavoidable loss, and the practical yield would probably be about 320 lbs. of clean fritt when perfectly dry. Then 45s. for 320 lbs. is as nearly as possible 15s. 9d. per cwt. for the dry fritt.

Costs of Glaze.

250 lbs. fritt at 15s. 9d. per cwt.	.	£1	15	6
160 „ stone at 2s. 6d. „	.	0	3	9
70 „ flint at 2s. „	.	0	1	3
130 „ lead at 16s. „	.	0	19	11
610 lbs.		£3	0	5

Grinding.

$12\frac{1}{2}$ sc. fritt at 8d. per score	. .	0	8	4
18 „ mixture at 4d. per score	.	0	6	0
		£3	14	9

Allowing a loss of say 10 lbs. weight in process, we have 600 lbs. clean glaze for £3. 14s. 9d., which is equivalent to say 14s. per cwt.

The conclusion we arrive at is then that, for such formulæ as we have supposed, the cost in the Staffordshire potteries are pretty nearly as under:—

Body clay, ready for use . .	39s. 1d. per ton.
Glaze	14s. per cwt.

CHAPTER X.

FORMS AND TABLES.

ARTICLES OF APPRENTICESHIP

made and entered into this day of 19 Between of in the County of of the first part, of of in the County of of the second part, and of aforesaid, an infant under the age of twenty-one years, of the third part, as follows:—

The said doth hereby, freely and voluntarily, and with the consent and approbation of the said (testified by h execution hereof), place and bind self apprentice to the said his successors and assigns, and them to serve and by them to be instructed in that branch of the China and Earthenware Trade called for the term of years. And the said do hereby, for self, h heirs, executors and administrators, covenant with the said h executors and assigns, that the said shall honestly, faithfully and diligently serve the said his executors and assigns, from the date hereof, for and during the said term of years, as an

apprentice, and will not waste, damage or destroy any of the property or effects of the said
his (or their) executors and assigns, and will regularly attend at the place or places of business at or near
aforesaid during such hours as may be appointed by the said executors or assigns. And will not on any occasion, or under any pretence whatever, absent self without permission

And further, that the said
h heirs, executors or administrators, will at all times during the said apprenticeship provide the said
with sufficient clothing, board, lodging and washing.

And, lastly, that the said
h heirs, executors or administrators, will indemnify the said h executors or assigns, against all losses, damages or expenses occasioned to them by reason of the disobedience or wilful default or neglect of the said
during his said apprenticeship.

And the said in consideration of the premises, do hereby accept the said
as an apprentice for the term of years, to be computed from the date hereof, and do hereby, for self, h executors and assigns, covenant with the said
h executors, administrators and assigns, that he will pay or cause to be paid to the said
during h apprenticeship, whether employed at
or at any other work on the manufactory, the following wages, namely :—

and after the same rate in each year for less than a week's work, which shall be deducted according to the days or parts of days on which the said
shall be absent or unable to perform the duties of h
apprenticeship and service.

And, lastly, for the true performance of all and every the covenants and conditions hereinbefore contained, each of the said parties hereto (so far as he lawfully can or may) hereby binds himself and themselves unto the other.

In witness whereof the said
and have hereunto set their hands and seals the day and year first before written.

Signed, sealed and delivered by the

before-named

and

in the presence of

MANUFACTURER'S GUIDE TO STOCK-TAKING.

The basis upon which a full and fair trade or commercial value can be put in estimating the stock on a manufactory is a matter of grave interest to the manufacturer. The method advised in this work, although a revolution on accustomed ideas, is nevertheless a most feasible one, and is calculated to show the true standing of a business in every particular, especially in the case of moulds and engravings, the value of which, in these days of rapid change of fashion, has been considerably lowered.

MATERIALS.

The full value of materials delivered on the works may be given, less the customary discounts allowed by the supplier.

In cases where an admixture has taken place, this cost should be added. In the case of a large stock of Ball Clays and Sagger Marl, the increased value of its being aged should be taken into account.

UTENSILS.

Engines, Mill Power and Machinery should be estimated at their actual cost, with a depreciatory allowance of 5 per cent. for each year's working, and wear and tear caused by production. Ordinary trade working utensils, in fair condition, may be taken at actual cost, less a deduction for wear and tear.

Blocks, Moulds and Cases.—The sum total expended on modelling expenses, mould makers' wages, cost of plaster, proportion of rent during the three previous years, the exact value of the blocks and cases in use prior to the time given, can only be appreciated by the orders their shapes command. There is, at the same time, always a certain value placed on a shape which has had a phenomenal run.

Copper Plate Engravings and Etchings.—A computation should be made of the cost of designs, purchases of engraved and etched plates, engravers' and etchers' wages, and cost of planishing during the three previous years, added to which the value of the copper plates in stock accurately scaled at 7½d. per lb. This will give a fair net value.

MANUFACTURED STOCK.

Green Ware.—This should be taken at current trade prices, with a reduction of 60 per cent.

Biscuit Ware may also be taken at current trade prices. In this case, however, the discount should be 50 per cent.

Enamelled, Printed, White and Common Ware to be taken at their usual scales, less the customary discounts;

and off the whole of the manufactured stock, it is desirable to deduct 25 per cent. discount to cover establishment and selling expenses and bad debts, etc.

TABLE

Of Relative Values of Potters' Materials, Calculated in Grade from One Ton to one Pound.

Per ton of 2240 lbs.			Per cwt. of 112 lbs.			Per ½ cwt. of 56 lbs.			Per ¼ cwt. of 28 lbs.			Per ⅛ cwt. of 14 lbs.			Per lb. of 16 ozs.		
£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.	£	s.	d.
28	0	0	1	8	0	0	14	0	0	7	0	0	3	6	0	0	3
30	6	8	1	10	4	0	15	2	0	7	7	0	3	9½	0	0	3¼
32	13	4	1	12	8	0	16	4	0	8	2	0	4	2	0	0	3½
35	0	0	1	15	0	0	17	6	0	8	9	0	4	4½	0	0	3¾
37	6	8	1	17	4	0	18	8	0	9	4	0	4	8½	0	0	4
39	13	4	1	19	8	0	19	10	0	9	11	0	4	11½	0	0	4¼
42	0	0	2	0	10	1	0	5	0	10	2½	0	5	1	0	0	4½
44	6	8	2	4	4	1	2	2	0	11	1	0	5	6½	0	0	4¾
46	13	4	2	6	8	1	3	4	0	11	8	0	5	10	0	0	5
49	0	0	2	9	0	1	4	6	0	12	3	0	6	1½	0	0	5¼
51	6	8	2	11	4	1	5	8	0	12	10	0	6	5	0	0	5½
53	13	4	2	13	8	1	6	10	0	13	5	0	7	7½	0	0	5¾
56	0	0	2	16	0	1	8	0	0	14	0	0	7	0	0	0	6
58	6	8	2	18	4	1	9	2	0	14	7	0	7	3½	0	0	6¼
60	13	4	3	0	8	1	10	4	0	15	2	0	7	7	0	0	6½
63	0	0	3	3	0	1	11	6	0	15	9	0	7	10½	0	0	6¾
65	6	8	3	5	4	1	12	8	0	16	1	0	8	2	0	0	7
67	13	4	3	7	8	1	13	10	0	16	11	0	8	5½	0	0	7¼
70	0	0	3	10	0	1	15	0	0	17	6	0	8	9	0	0	7½
72	6	8	3	12	4	1	16	2	0	18	1	0	9	0½	0	0	7¾
74	13	4	3	14	8	1	17	4	0	18	8	0	9	10	0	0	8
77	0	0	3	17	0	1	18	6	0	19	3	0	9	7½	0	0	8¼
79	6	8	3	19	4	1	19	8	0	19	10	0	9	11	0	0	8½
81	13	4	4	1	8	2	0	10	1	0	5	0	10	2½	0	0	8¾
84	0	0	4	4	0	2	2	0	1	1	0	0	10	6	0	0	9
86	6	8	4	6	4	2	3	2	1	1	7	0	10	9½	0	0	9¼
88	13	2	4	8	8	2	4	4	1	2	2	0	11	1	0	0	9½
91	0	0	4	11	0	2	5	6	1	2	9	0	11	4½	0	0	9¾
93	6	8	4	13	4	2	6	8	1	3	4	0	11	8	0	0	10
95	13	4	4	15	8	2	7	10	1	3	11	0	11	11½	0	0	10¼
98	0	0	4	18	0	2	9	0	1	4	6	0	12	3	0	0	10½
100	6	8	5	0	4	2	10	2	1	5	1	0	12	6½	0	0	10¾
102	13	4	5	2	8	2	11	4	1	5	8	0	12	10	0	0	11
105	0	0	5	5	0	2	12	6	1	6	3	0	13	1½	0	0	11¼
107	6	8	5	7	4	2	13	8	1	6	10	0	13	5	0	0	11½
109	13	4	5	9	8	2	14	10	1	7	5	0	13	8½	0	0	11¾
112	0	0	5	12	0	2	16	0	1	8	0	0	14	0	0	1	0

HOURLY WAGES TABLE.

No. of Hours	1d.		2d.		3d.		4d.		5d.		6d.		7d.		8d.		9d.		10d.		11d.		1s.	
	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.
1	0	1	0	2	0	3	0	4	0	5	0	6	0	7	0	8	0	9	0	10	0	11	1	0
2	0	2	0	4	0	6	0	8	0	10	1	0	1	2	1	4	1	6	1	8	1	10	2	0
3	0	3	0	6	0	9	1	0	1	3	1	6	1	9	2	0	2	3	2	6	2	9	3	0
4	0	4	0	8	1	0	1	4	1	8	2	0	2	4	2	8	3	0	3	4	3	8	4	0
5	0	5	0	10	1	3	1	8	2	1	2	6	2	11	3	4	3	9	4	2	4	7	5	0
6	0	6	1	0	1	6	2	0	2	6	3	0	3	6	4	0	4	6	5	0	5	6	6	0
7	0	7	1	2	1	9	2	4	2	11	3	6	4	1	4	8	5	3	5	10	6	5	7	0
8	0	8	1	4	2	0	2	8	3	4	4	0	4	8	5	4	6	0	6	8	7	4	8	0
9	0	9	1	6	2	3	3	0	3	9	4	6	5	3	6	0	6	9	7	6	8	3	9	0
10	0	10	1	8	2	6	3	4	4	2	5	0	5	10	6	8	7	6	8	4	9	2	10	0
11	0	11	1	10	2	9	3	8	4	7	5	6	6	5	7	4	8	3	9	2	10	1	11	0
12	1	0	2	0	3	0	4	0	5	0	6	0	7	0	8	0	9	0	10	0	11	0	12	0
13	1	1	2	2	3	3	4	4	5	5	6	6	7	7	8	8	9	9	10	10	11	11	13	0
14	1	2	2	4	3	6	4	8	5	10	7	0	8	2	9	4	10	6	11	8	12	10	14	0
15	1	3	2	6	3	9	5	0	6	3	7	6	8	9	10	0	11	3	12	6	13	9	15	0
16	1	4	2	8	4	0	5	4	6	8	8	0	9	4	10	8	12	0	13	4	14	8	16	0
17	1	5	2	10	4	3	5	8	7	1	8	6	9	11	11	4	12	9	14	2	15	7	17	0
18	1	6	3	0	4	6	6	0	7	6	9	0	10	6	12	0	13	6	15	0	16	6	18	0
19	1	7	3	2	4	9	6	4	7	11	9	6	11	1	12	8	14	3	15	10	17	5	19	0
20	1	8	3	4	5	0	6	8	8	4	10	0	11	8	13	4	15	0	16	8	18	4	20	0
21	1	9	3	6	5	3	7	0	8	9	10	6	12	3	14	0	15	9	17	6	19	3	21	0
22	1	10	3	8	5	6	7	4	9	2	11	0	12	10	14	8	16	6	18	4	20	2	22	0
23	1	11	3	10	5	9	7	8	9	7	11	6	13	5	15	4	17	3	19	2	21	1	23	0
24	2	0	4	0	6	0	8	0	10	0	12	0	14	0	16	0	18	0	20	0	22	0	24	0
25	2	1	4	2	6	3	8	4	10	5	12	6	14	7	16	8	18	9	20	10	22	11	25	0
26	2	2	4	4	6	6	8	8	10	10	13	0	15	2	17	4	19	6	21	8	23	10	26	0
27	2	3	4	6	6	9	9	0	11	3	13	6	15	9	18	0	20	3	22	6	24	9	27	0
28	2	4	4	8	7	0	9	4	11	8	14	0	16	4	18	8	21	0	23	4	25	8	28	0
29	2	5	4	10	7	3	9	8	12	1	14	6	16	11	19	4	21	9	24	2	26	7	29	0
30	2	6	5	0	7	6	10	0	12	6	15	0	17	6	20	0	22	6	25	0	27	6	30	0
31	2	7	5	2	7	9	10	4	12	11	15	6	18	1	20	8	23	3	25	10	28	5	31	0
32	2	8	5	4	8	0	10	8	13	4	16	0	18	8	21	4	24	0	26	8	29	4	32	0
33	2	9	5	6	8	3	11	0	13	9	16	6	19	3	22	0	24	9	27	6	30	3	33	0
34	2	10	5	8	8	6	11	4	14	2	17	0	19	10	22	8	25	6	28	4	31	2	34	0
35	2	11	5	10	8	9	11	8	14	7	17	6	20	5	23	4	26	3	29	2	32	1	35	0
36	3	0	6	0	9	0	12	0	15	0	18	0	21	0	24	0	27	0	30	0	33	0	36	0
37	3	1	6	2	9	3	12	4	15	5	18	6	21	7	24	8	27	9	30	10	33	11	37	0
38	3	2	6	4	9	6	12	8	15	10	19	0	22	2	25	4	28	6	31	8	34	10	38	0
39	3	3	6	6	9	9	13	0	16	3	19	6	22	9	26	0	29	3	32	6	35	9	39	0
40	3	4	6	8	10	0	13	4	16	8	20	0	23	4	26	8	30	0	33	4	36	8	40	0
41	3	5	6	10	10	3	13	8	17	1	20	6	23	11	27	4	30	9	34	2	37	7	41	0
42	3	6	7	0	10	6	14	0	17	6	21	0	24	6	28	0	31	6	35	0	38	6	42	0
43	3	7	7	2	10	9	14	4	17	11	21	6	25	1	28	8	32	3	35	10	39	5	43	0
44	3	8	7	4	11	0	14	8	18	4	22	0	25	8	29	4	33	0	36	8	40	4	44	0
45	3	9	7	6	11	3	15	0	18	9	22	6	26	3	30	0	33	9	37	6	41	3	45	0
46	3	10	7	8	11	6	15	4	19	2	23	0	26	10	30	8	34	6	38	4	42	2	46	0
47	3	11	7	10	11	9	15	8	19	7	23	6	27	5	31	4	35	3	39	2	43	1	47	0
48	4	0	8	0	12	0	16	0	20	0	24	0	28	0	32	0	36	0	40	0	44	0	48	0
49	4	1	8	2	12	3	16	4	20	5	24	6	28	7	32	8	36	9	40	10	44	11	49	0
50	4	2	8	4	12	6	16	8	20	10	25	0	29	2	33	4	37	6	41	8	45	10	50	0
51	4	3	8	6	12	9	17	0	21	3	25	6	29	9	34	0	38	3	42	6	46	9	51	0
52	4	4	8	8	13	0	17	4	21	8	26	0	30	4	34	8	39	0	43	4	47	8	52	0
53	4	5	8	10	13	3	17	8	22	1	26	6	30	11	35	4	39	9	44	2	48	7	53	0
54	4	6	9	0	13	6	18	0	22	6	27	0	31	6	36	0	40	6	45	0	49	6	54	0
55	4	7	9	2	13	9	18	4	22	11	27	6	32	1	36	8	41	3	45	10	50	5	55	0
56	4	8	9	4	14	0	18	8	23	4	28	0	32	8	37	4	42	0	46	8	51	4	56	0

WORKMEN'S SETTLING TABLE, CALCULATED FROM ONE TO TEN DOZENS AT PER SCORE.

20 doz. pieces at	1s.		1s. 3d.		1s. 6d.		1s. 9d.		2s.		2s. 3d.		2s. 6d.		2s. 9d.		3s.		3s. 3d.		3s. 6d.		3s. 9d.		4s.		4s. 6d.		4s. 9d.		5s.	
	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.
10 dozen	0	6	0	7½	0	9	0	10½	1	0	1	1½	1	3	1	4½	1	6	1	7½	1	9	1	10½	2	0	2	3	2	4½	2	6
9 ..	0	5½	0	6½	0	8	0	9	0	11	1	0	1	1½	1	2½	1	4	1	5½	1	7	1	7¼	1	10	2	0	2	0¾	2	3
8 ..	0	1¾	0	6	0	7	0	8	0	9½	0	10½	1	0	1	1	1	2	1	3½	1	4¾	1	4¾	1	7	1	9	1	10	2	0
7 ..	0	1	0	5	0	6	0	7	0	8	0	9	0	10½	0	11	1	0	1	1	1	2	1	2	1	4	1	6	1	7	1	9
6 ..	0	3½	0	4	0	5	0	6	0	7	0	8	0	9	0	9	0	10	0	11	1	0	1	0	1	2	1	4	1	4½	1	6
5 ..	0	3	0	3½	0	4½	0	5	0	6	0	6½	0	7½	0	8¼	0	9	0	9½	0	10½	0	11¼	1	0	1	1½	1	2½	1	3
4 ..	6	2½	0	3	0	3½	0	4	0	4½	0	5	0	6	0	6½	0	7	0	7½	0	8¼	0	8¼	0	9	0	10	0	11	1	0
3 ..	0	1¾	0	2	0	2½	0	3	0	3½	0	4	0	4½	0	4½	0	5	0	5½	0	6	0	6	0	7	0	8	0	8¼	0	9
2 ..	0	1	0	1½	0	1¾	0	2	0	2½	0	2½	0	3	0	3½	0	3½	0	4	0	4	0	4	0	5	0	5	0	5½	0	6
1 ..	0	0½	0	0¾	0	1	0	1	0	1	0	1	0	1½	0	1½	0	1¾	0	2	0	2	0	2	0	2	0	2	0	2¾	0	3

COMPARATIVE GUIDE FOR EARTHENWARE AND CHINA MANUFACTURERS IN THE USE OF SLOP FLINT AND SLOP STONE.

Machine Weight. Hundredweight of 112 lbs.			Pint of 28 ounces.	Pint of 28½ ounces.	Pint of 29 ounces.	Pint of 29½ ounces.	Pint of 30 ounces.	Pint of 30½ ounces.	Pint of 31 ounces.	Pint of 31½ ounces.	Pint of 32 ounces.	Pint of 32½ ounces.	Pint of 33 ounces.	Pint of 33½ ounces.	Pint of 34 ounces.
Cwts.	Qrs.	Lbs.	Pecks.	Pecks.	Pecks.	Pecks.	Pecks.	Pecks.	Pecks.	Pecks.	Pecks.	Pecks.	Pecks.	Pecks.	Pecks.
16	0	0	35¼	37¾	43¼	44½	46	49½	51	53	56¼	58¼	61½	64¾	66
16	2	0	36½	39½	44¼	46¼	48½	51	53½	55	57¾	60	63½	66½	68
17	0	0	38½	41¼	45¼	47½	50	52½	55	57	60	61¾	65¼	68¼	70
17	2	0	40½	43	46¼	48¼	51½	54	56½	58½	61¼	64½	67½	70	72
18	0	0	42½	44¾	47¼	50	53	55½	58	60½	63	66¼	69	71¾	74
18	2	0	44½	46½	48¼	51¼	54½	57	59½	62	64¾	68	71½	73½	76
19	0	0	45	47¼	50	53	56	58½	61	63¾	66½	70	73½	75¾	78
19	2	0	46¼	48¾	51½	54¼	57	59¾	62¾	65½	68½	71¾	75¼	77½	80
20	0	0	48	50½	53	55½	58¼	61½	64½	67¼	70	73½	77¼	79½	82
20	2	0	49	51½	54¼	57	59¾	62¾	66	68¾	71¾	75½	79¼	81¼	84
21	0	0	50	52¾	55½	58¼	61¼	64¼	67½	70½	73½	77¼	81¼	83½	86
21	2	0	51	53¾	56¾	59¾	62¼	65¾	69¼	72¼	75¼	79	83	85½	88¼
22	0	0	52	55	58	60¾	63½	67¼	71	74	77	81	85	87¾	90
22	2	0	53	56	59¼	62½	65¼	68¾	72¼	75½	78¾	82¾	87	89	92½
23	0	0	54½	57¼	60½	63¾	67	70¼	73½	77	80½	84¾	89	91¾	94½
23	2	0	55½	58½	61¾	65	68¼	71¾	75¼	78¾	82¼	86½	90¾	93½	96½
24	0	0	57	60	63	66¼	69½	73¼	77	80½	84	88¼	92¾	95½	98¼
24	2	0	58¼	61¼	64¼	67¾	71¼	74¾	78½	82	85¾	90	94½	97½	100½
25	0	0	59½	62½	65½	69¼	73	76½	80	83¾	87½	92	96½	99¼	102¼
25	2	0	60¾	63¾	67	70¾	74½	78	81½	85¼	89¼	93¾	98½	101½	104¼
26	0	0	62	65¼	68½	72¼	76	79½	83	87	91	95¾	100½	103¾	107

Note. 16 pints of slop flint or stone weighing 32 lbs. are 1 peck; 40 pecks of slop flint or stone weighing 11 cwt. 1 qr. 20 lbs. are 1 tub.

FOREIGN TERMS APPLIED TO EARTHENWARE AND CHINA GOODS.

English.	German.	French.	Spanish.	Portuguese.
Dinner Plates.	Speiseteller.	Plât du diner.	Platos paros commida.	Lamina.
Soup ,,	Suppenteller.	Plât du bouillon.	Platos idem paras sopa.	Lamina sopa.
Dessert ,,	Dessert-teller.	Plât du dessert.	Platos paros dulces.	Plata para dulca.
Comportiers.	Compotschusseln.	Compotiers.	Platos paros fruitas.	Plata para fruita.
Ordinary Dishes.	Gewöhnliche Schusseln.	Assiette.	Prato.	Prata.
Soup Tureens.	Suppenterrinen.	Soupère.	Sopera.	Sàpero.
Sauce ,,	Saucenterrinen.	Saucière.	Saucra.	Sauceró.
Baking Dishes.	Backschusseln.	Tourtière.	Tartera.	Tarteró.
Cover Dishes.	Deckschusseln.	Cloche du plât.	Platos paros papas.	Plata para papa.
Ewer.	Eimer.	Pot à l'eau.	Aiquieros.	Numo jarros.
Basin.	Waschbecken.	Bol.	Bàson.	Bacia para laven.
Chamber.	Nachtgeschirr.	Pot de chambre.	Orinal.	Ourinol.
Soap Tray.	Seifennapf.	Savonette.	Jabon.	Sabàs.
Tea Cup.	Theetassen.	Tasse à thé.	Tasa ó té.	Tassa on té.
Coffee Cup.	Kaffeetassen.	Tasse à café.	Tasa ó café.	Tass on cafo.

Note.—The measurement of size is always given according to the metrical standard. A standard of comparison appears on page 195 of the Manual.

TABLE FOR THE CONVERSION OF METRICAL WEIGHTS AND MEASURES USED ON THE CONTINENT AND SOUTH AMERICA.

Remarks.—The metrical or French system is based upon the (assumed) length of the fourth part of the terrestrial meridian. The ten millionth part of this arc was chosen as the unit of length, and called a mètre. The cube of the tenth part of the mètre was adopted as the unit of capacity, and denominated a litre. The weight of a litre of distilled water at its greatest density was called a kilogramme, of which the thousandth part, or gramme, was adopted as the unit of weight. The multiples of these, proceeding in decimal progression, are distinguished by the employment of the prefixes deca, hecto, kilo, and myria from the Greek, and the subdivisions by deci, centi, and milli from the Latin. A décimètre is equivalent as a measure of length to 3·93708 inches of the English system, as is also 1 litre or cubic décimètre equivalent to 1·760 of an English pint measure.

Metres into English Yards of 36 Inches.	Yards.	Litres into English Quarts and Gallons.	Galls.	Quarts.	Kilogrammes into English.	Cwts.	Qrs.	Lbs.	Ozs.
1 mètre equivalent to	1·094	1 litre equivalent to	0	0·880	1 kilogramme equivalent to	0	0	2	3¼
2	2·187	2 ,, ,,	0	1·761	2 ,, ,,	0	0	4	6½
3	3·281	3 .. ,,	0	2·611	3 .. ,,	0	0	6	9¾
4 ,, ..	4·371	4 .. ,,	0	3·521	4 ,, ,,	0	0	8	13
5	5·168	5 ,, ..	1	0·402	5 ,, ..	0	0	11	0¼
6 ,, ,,	6·562	6 ,, ,,	1	1·282	6 ,, ,,	0	0	13	3½
7 ,, ..	7·655	7	1	2·163	7 .. ,,	0	0	15	7
8	8·749	8 ,, ,,	1	3·043	8	0	0	17	10¼
9 ,, ..	9·843	9 ,, ,,	1	3·923	9 ,, ,,	0	0	19	13½
10 ,, ,,	10·936	10 ,, ,,	2	0·804	10	0	0	22	0¾
20 ,, ..	21·873	20	4	1·608	20 ,, ,,	0	1	16	1½
30	32·809	30 ,, ..	6	2·412	30 ,, ,,	0	2	10	2½
40	43·745	40 ,, ..	8	3·215	40	0	3	4	3
50	54·682	50 ,, ,,	11	0·019	50 ,, ..	0	3	26	3¼
60	65·618	60 ,, ,,	13	0·823	60 ,, ..	1	0	20	1½
70 ,, ..	76·554	70 ,, ,,	15	1·627	70	1	1	14	5¼
80 .. ,,	87·491	80 .. ,,	17	2·421	80	1	2	8	6
90	98·427	90 ,, ,,	19	3·325	90	1	3	2	6½
100 .. ,,	109·363	100 ,, ,,	22	0·039	100 .. ,,	1	3	24	7

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